FIGURE 1A

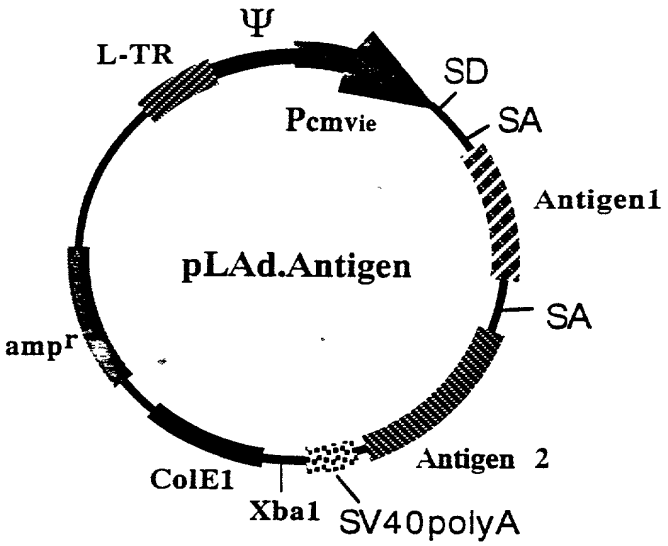


FIGURE 1B

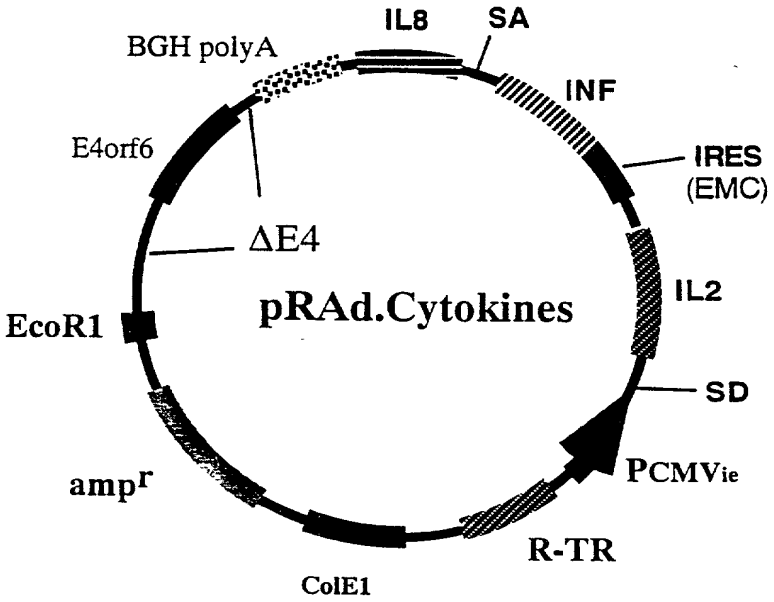


FIGURE 1C

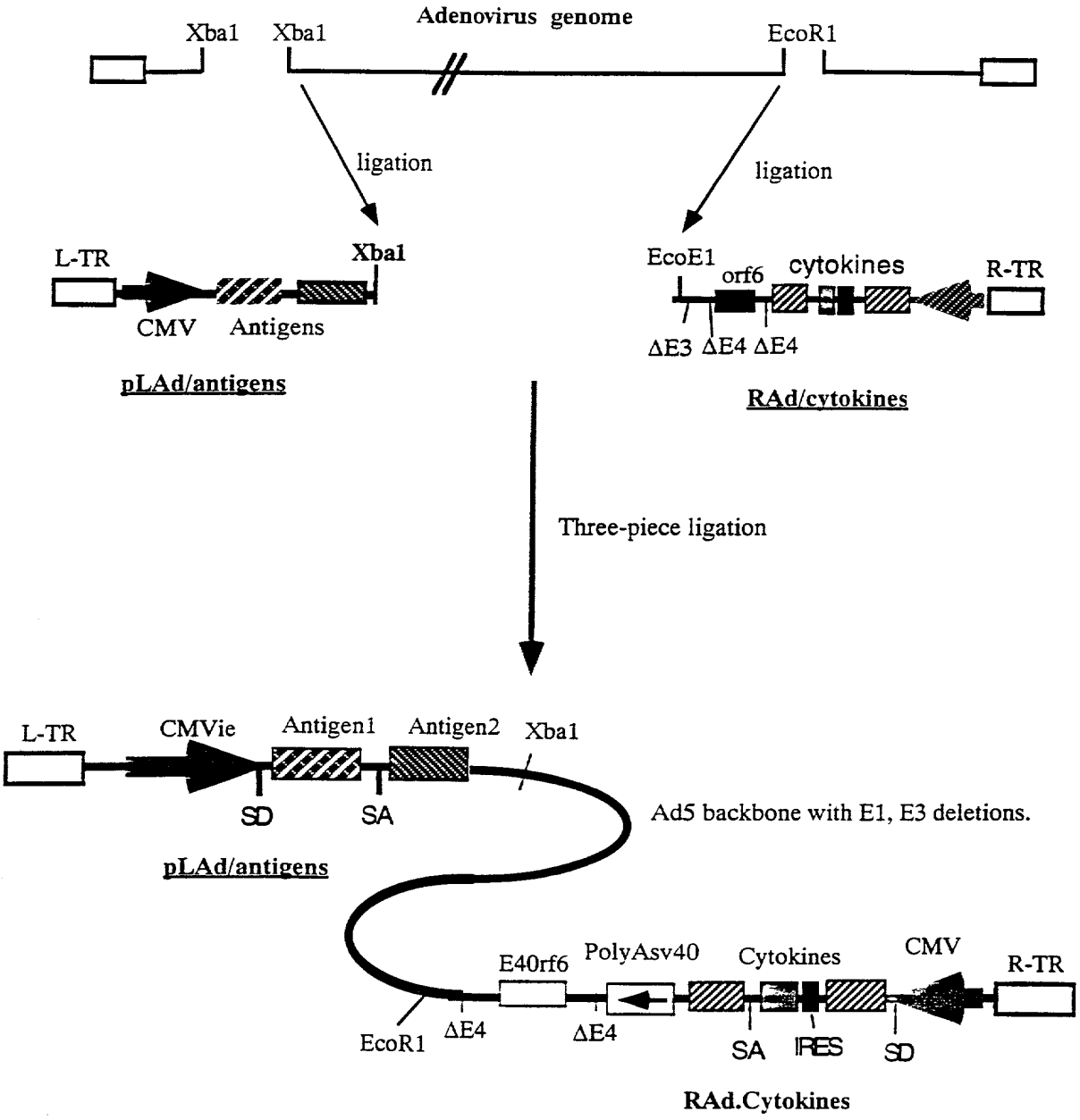
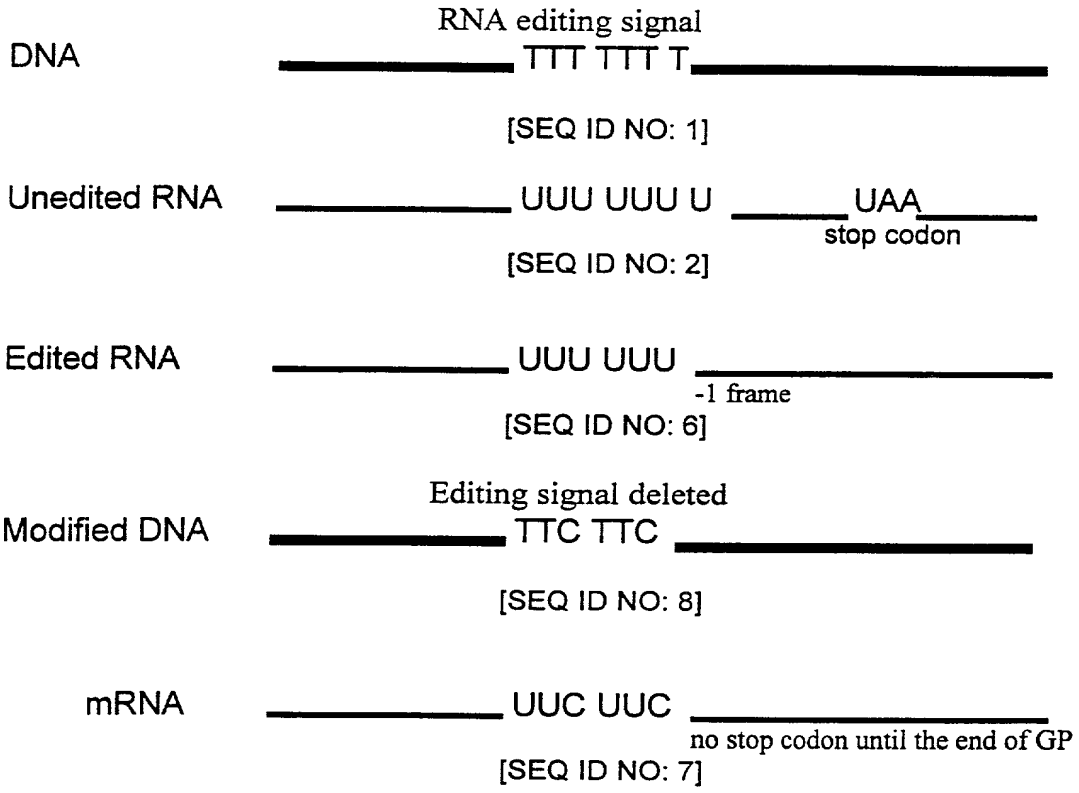

Adenovirus genome
Xba1
Xba1
EcoR1
ligation
ligation
L-TR
Xba1
CMV
Antigens
pLAd/antigens
EcoE1
orf6
cytokines
R-TR
ΔE3 ΔE4 ΔE4
RAd/cytokines
Three-piece ligation
L-TR
CMVie
Antigen1
Antigen2
Xba1
SD
SA
pLAd/antigens
Ad5 backbone with E1, E3 deletions.
E40rf6
PolyAsv40
Cytokines
CMV
R-TR
EcoR1
ΔE4
ΔE4
SA
IRES
SD
RAd.Cytokines

FIGURE 2


RNA editing signal
DNA
TTT TTT T
[SEQ ID NO: 1]
Unedited RNA
UUU UUU U
UAA
stop codon
[SEQ ID NO: 2]
Edited RNA
UUU UUU
-1 frame
[SEQ ID NO: 6]
Editing signal deleted
Modified DNA
TTC TTC
[SEQ ID NO: 8]
mRNA
UUC UUC
no stop codon until the end of GP
[SEQ ID NO: 7]

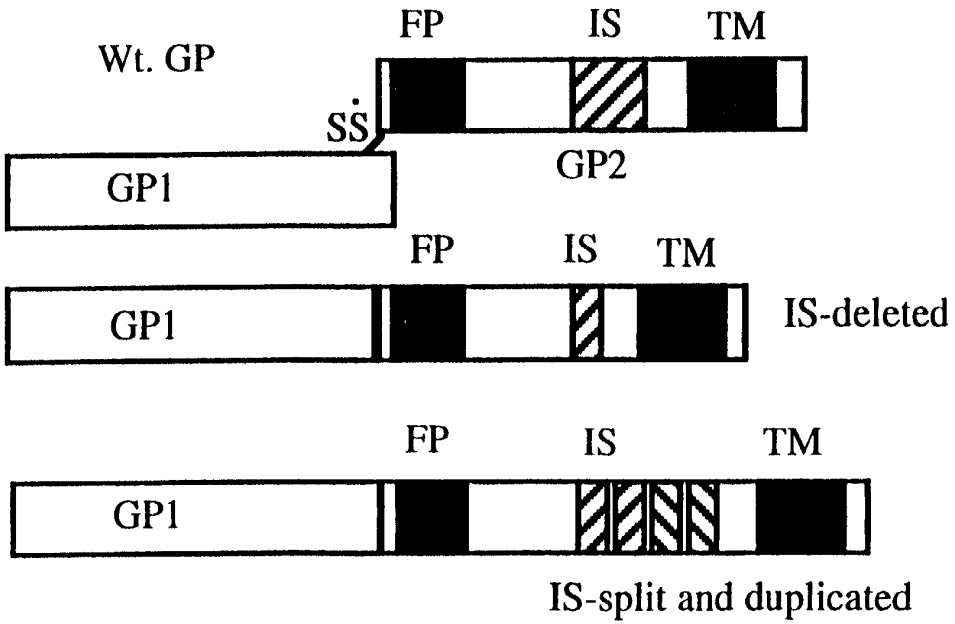


FIGURE 3A

FIGURE 3B

FIGURE 3C

FIGURE 4A

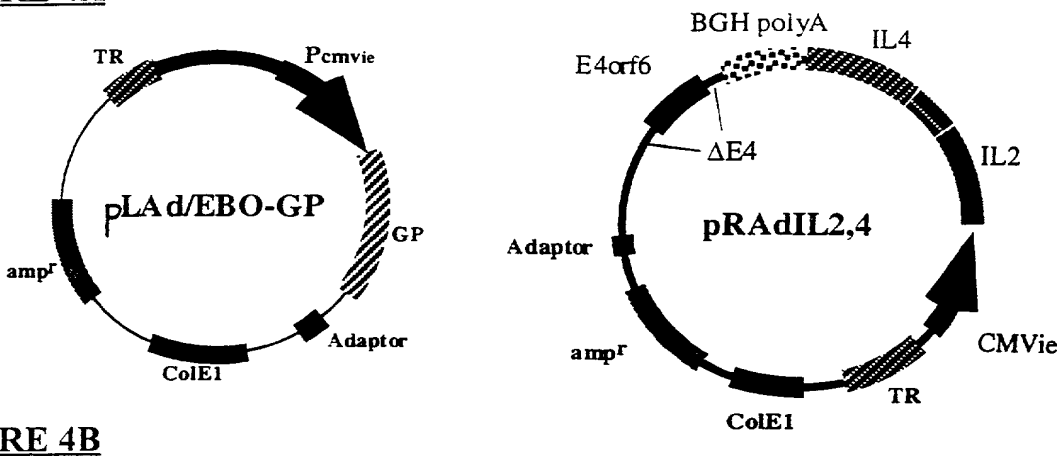


FIGURE 4B

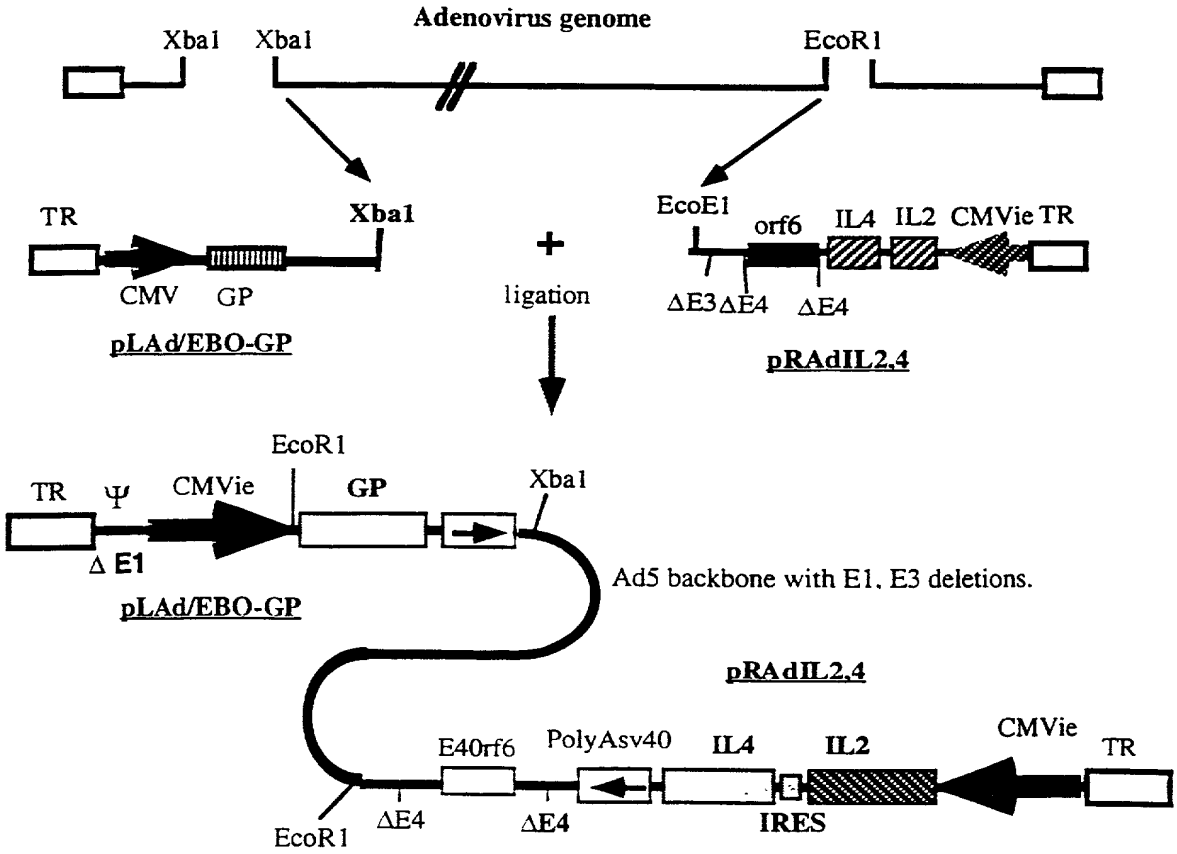
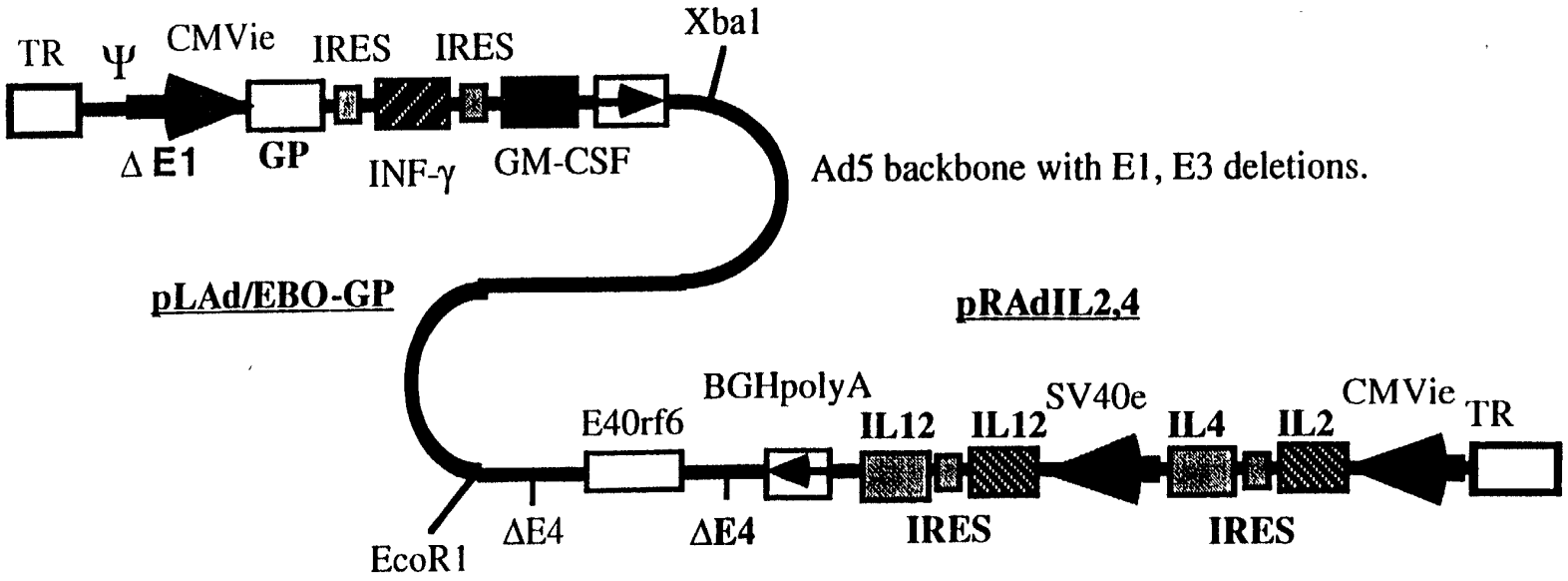


FIGURE 5



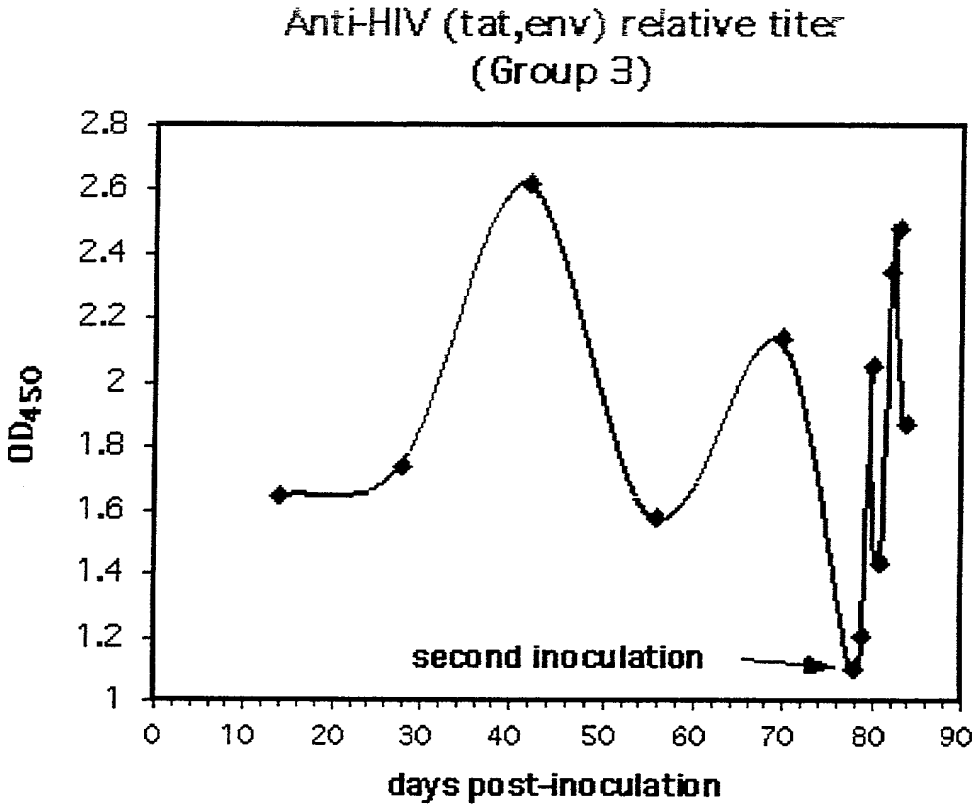


FIGURE 6

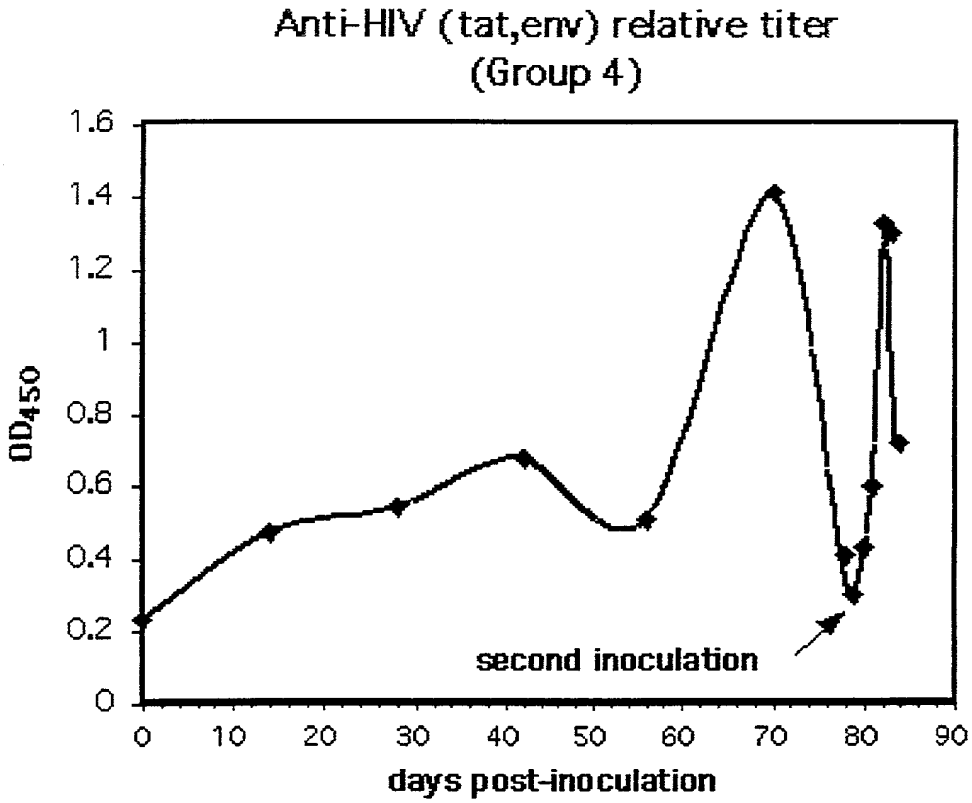


FIGURE 7

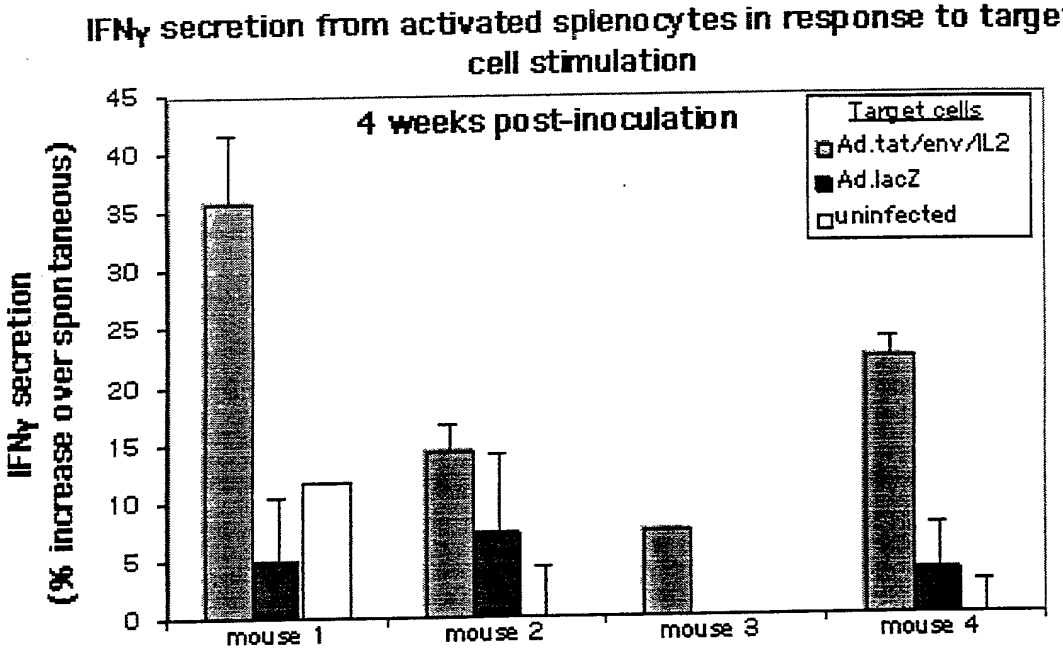


FIGURE 8A

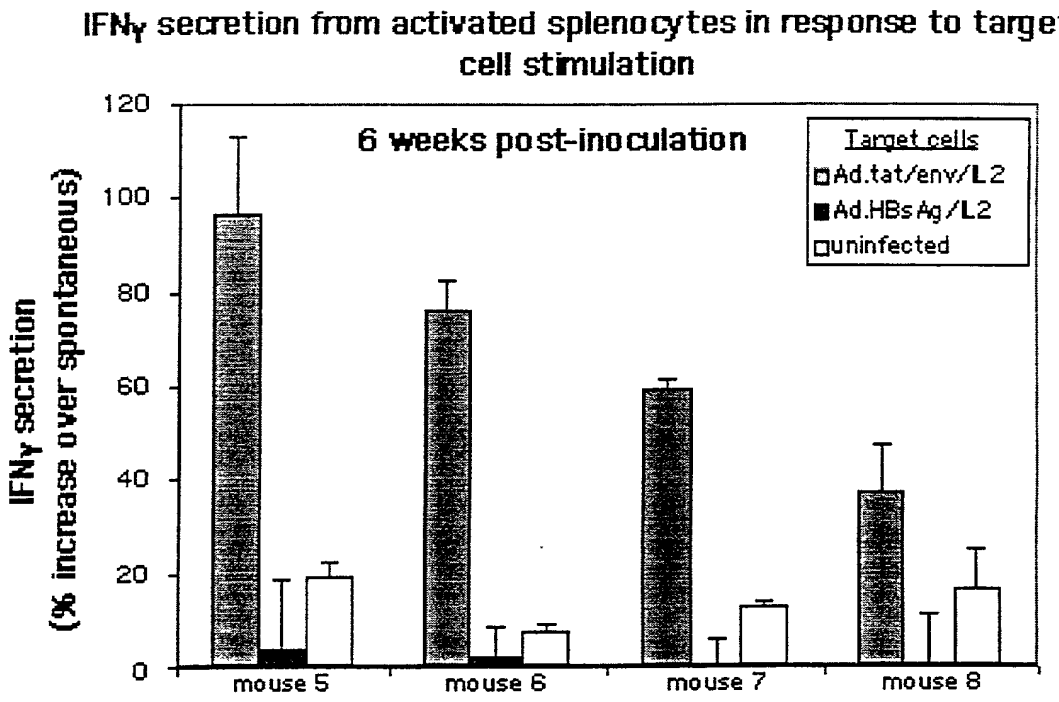

IFNγ secretion from activated splenocytes in response to target cell stimulation
6 weeks post-inoculation
Target cells
Ad.tat/env/L2
Ad.HBsAg/L2
uninfected
IFNγ secretion
(% increase over spontaneous)
120
100
80
60
40
20
0
mouse 5
mouse 6
mouse 7
mouse 8

FIGURE 8B

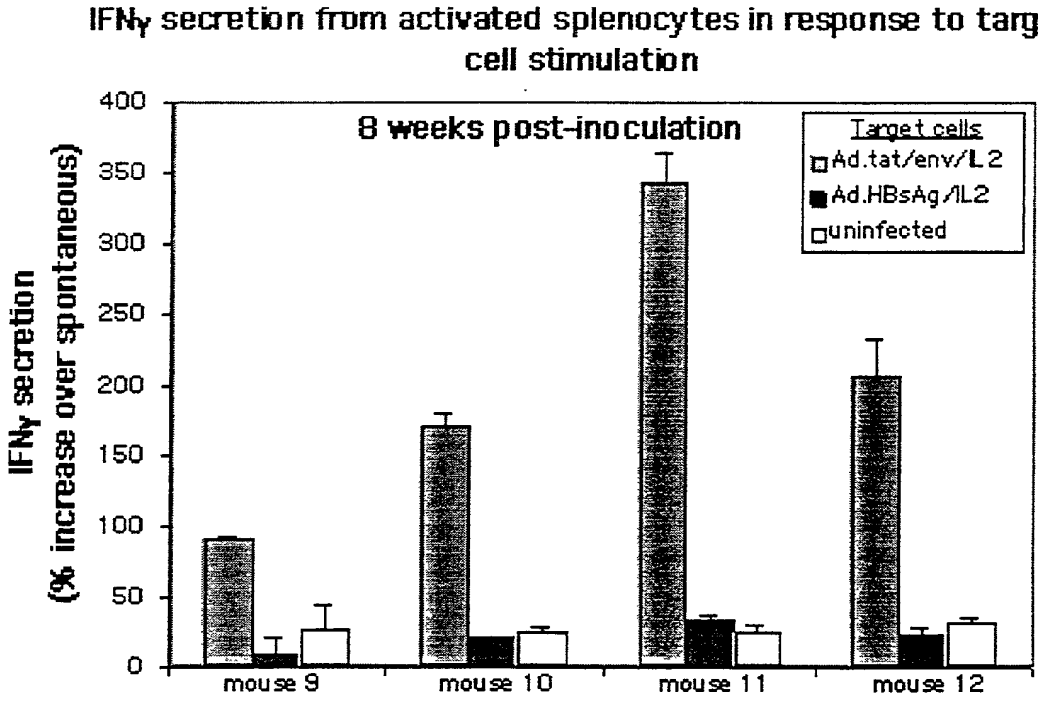

IFNγ secretion from activated splenocytes in response to target cell stimulation
8 weeks post-inoculation
Target cells
Ad.tat/env/IL2
Ad.HBsAg/IL2
uninfected
IFNγ secretion
(% increase over spontaneous)
400
350
300
250
200
150
100
50
0
mouse 9
mouse 10
mouse 11
mouse 12

FIGURE 8C

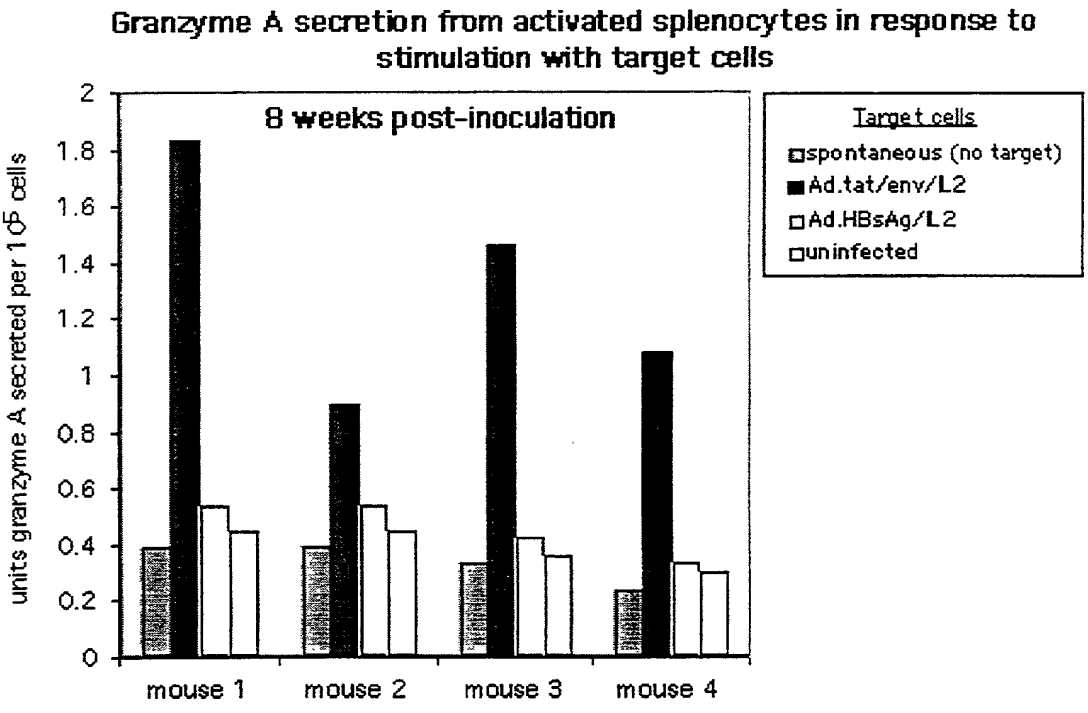

Granzyme A secretion from activated splenocytes in response to stimulation with target cells
8 weeks post-inoculation
units granzyme A secreted per 10^5 cells
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
mouse 1
mouse 2
mouse 3
mouse 4
Target cells
spontaneous (no target)
Ad.tat/env/L2
Ad.HBsAg/L2
uninfected

FIGURE 9

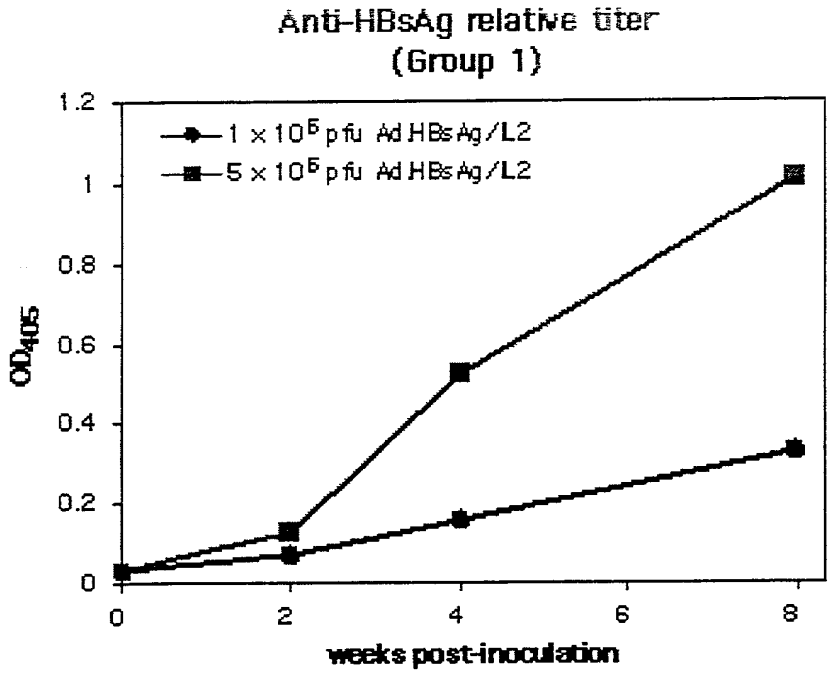


FIGURE 10A

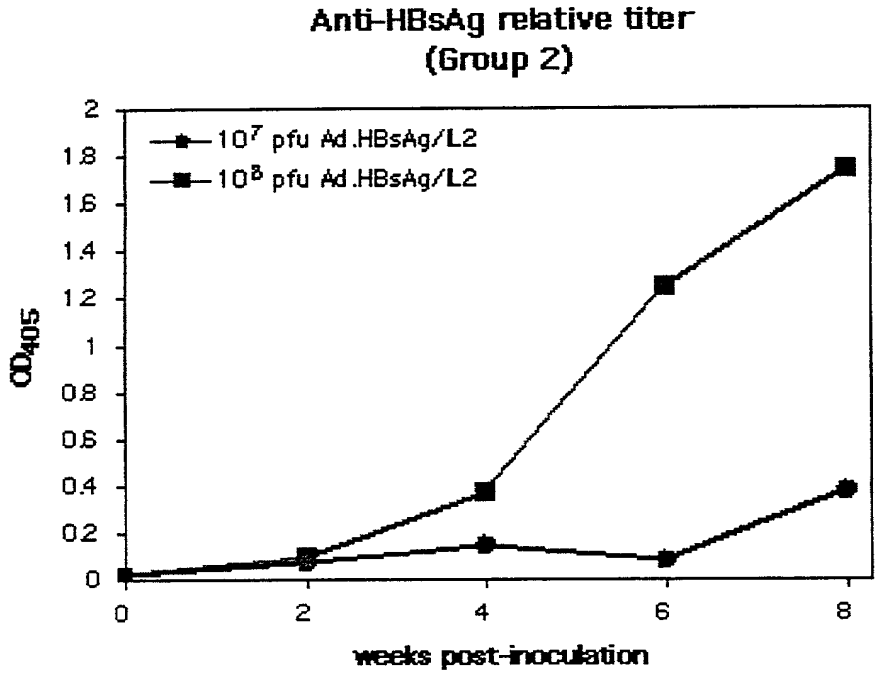


FIGURE 10B

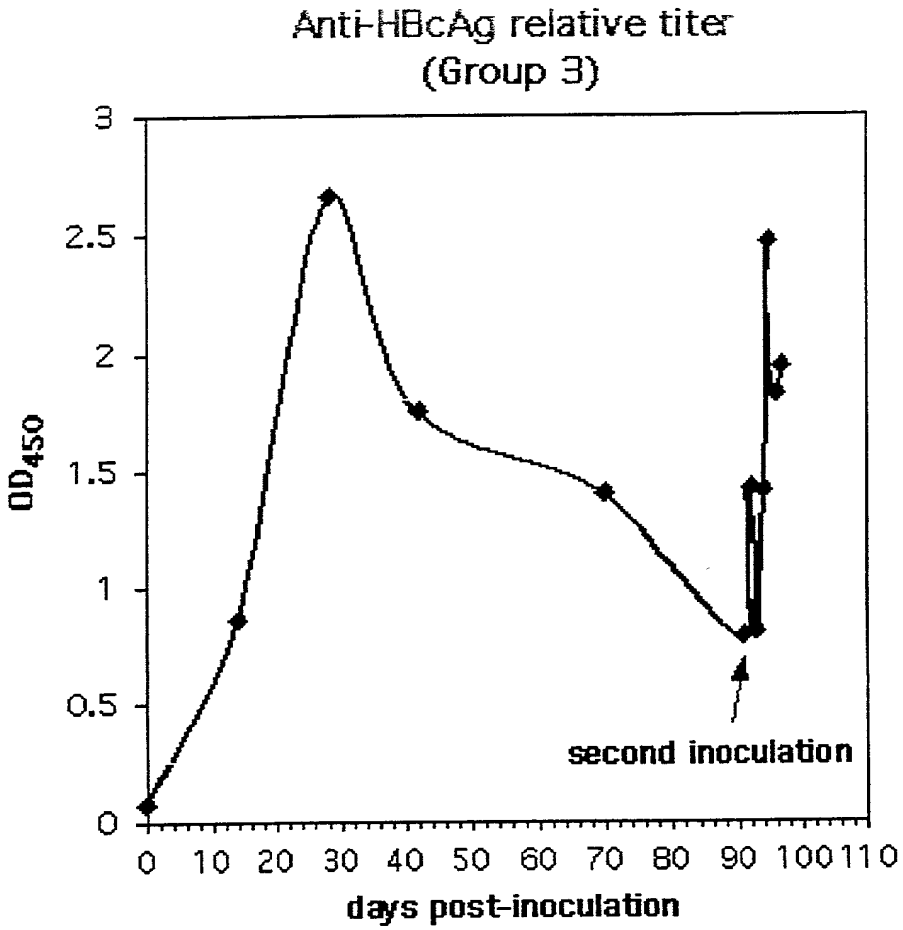


FIGURE 11A

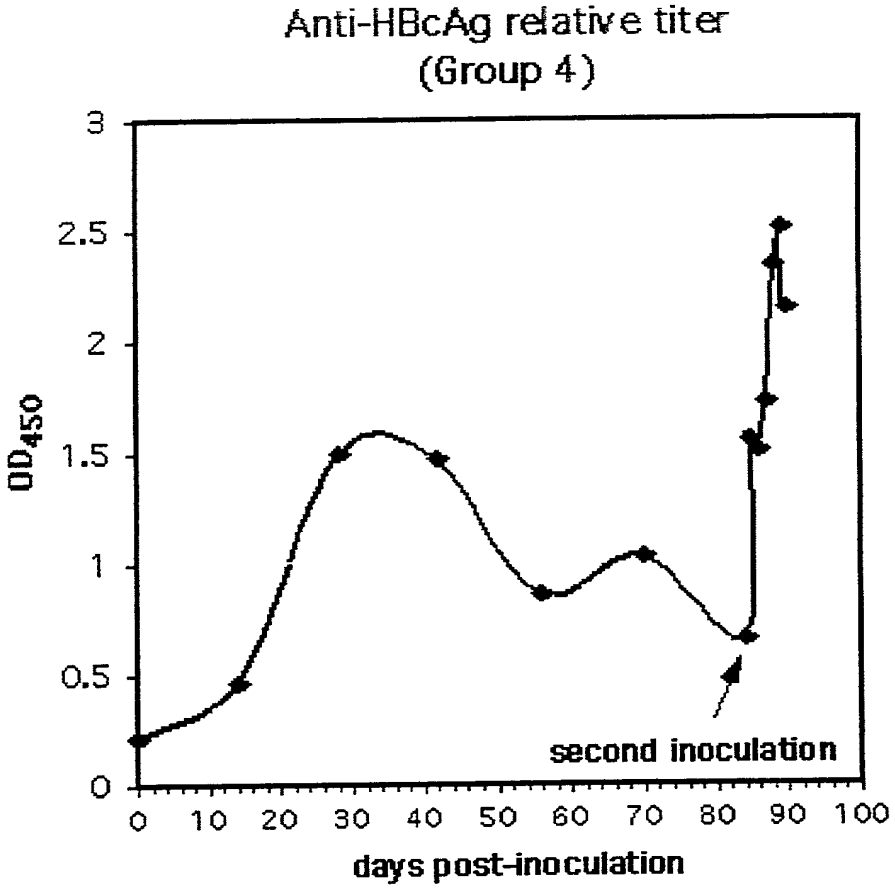
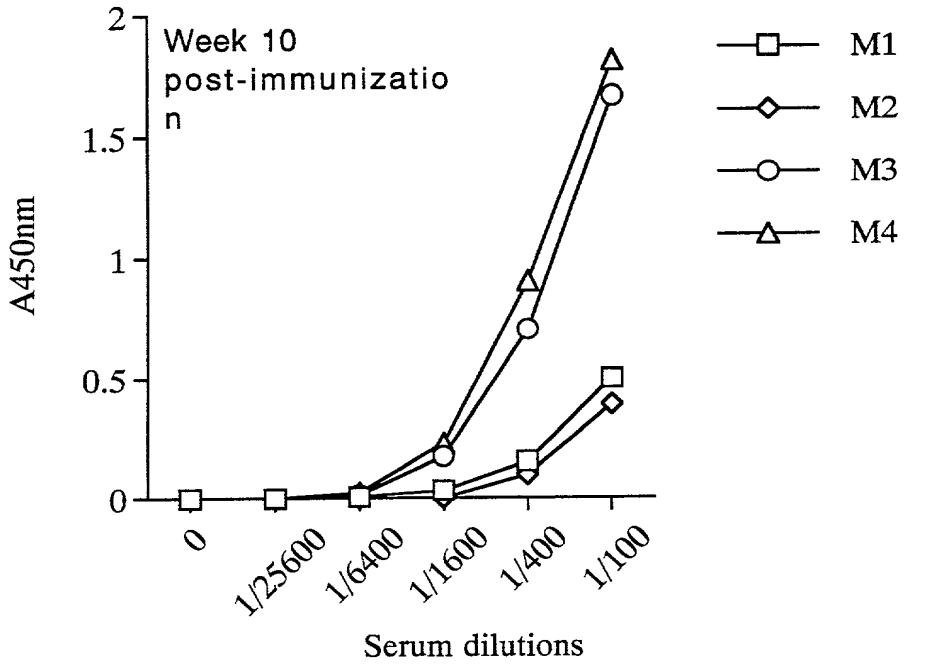

Anti-HBcAg relative titer
(Group 4)
OD450
3
2.5
2
1.5
1
0.5
0
0
10
20
30
40
50
60
70
80
90
100
days post-inoculation
second inoculation

FIGURE 11B

FIGURE 12

A.


Week 10 post-immunizatio n
A450nm
2
1.5
1
0.5
0
0
1/25600
1/6400
1/1600
1/400
1/100
Serum dilutions
M1
M2
M3
M4

B.

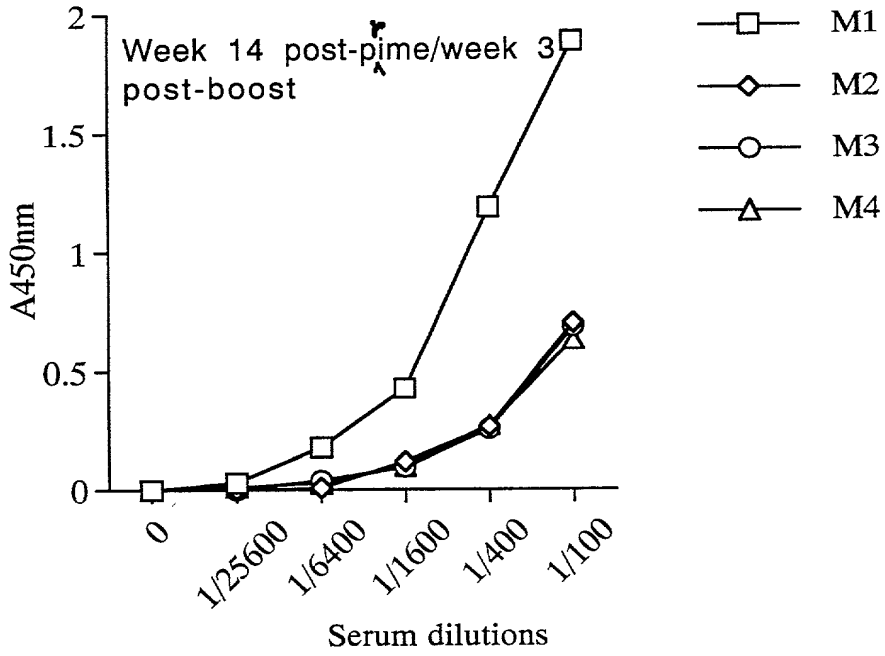
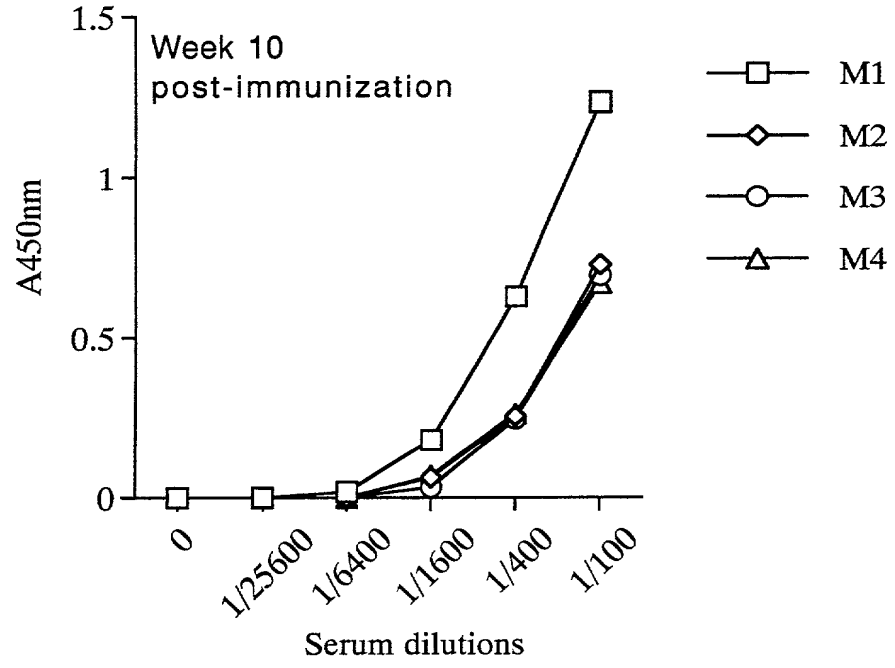

Week 14 post-prime/week 3 post-boost
A450nm
2
1.5
1
0.5
0
0
1/25600
1/6400
1/1600
1/400
1/100
Serum dilutions
M1
M2
M3
M4

FIGURE 13

A.


Week 10
post-immunization
A450nm
1.5
1
0.5
0
0
1/25600
1/6400
1/1600
1/400
1/100
Serum dilutions
M1
M2
M3
M4

B.

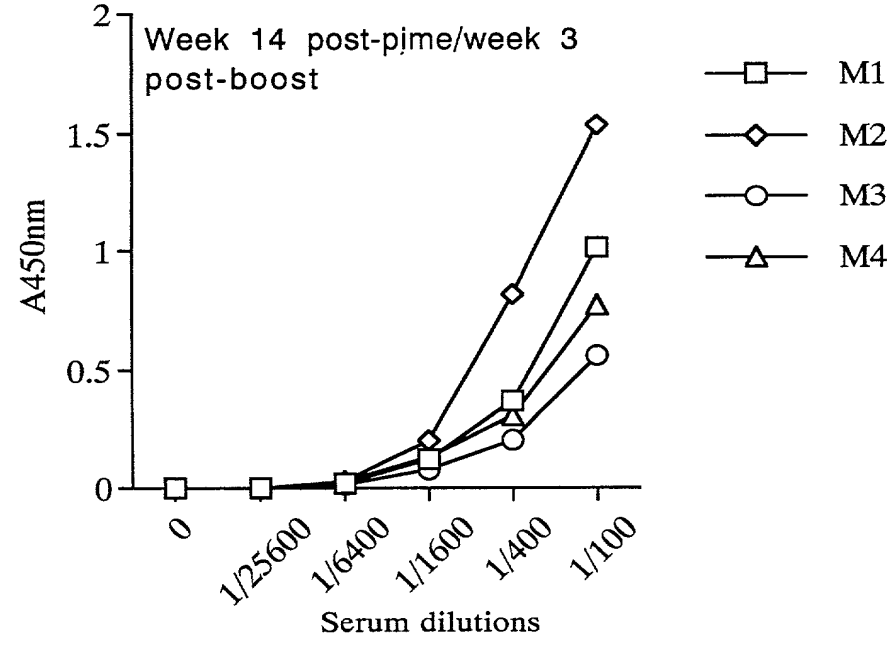
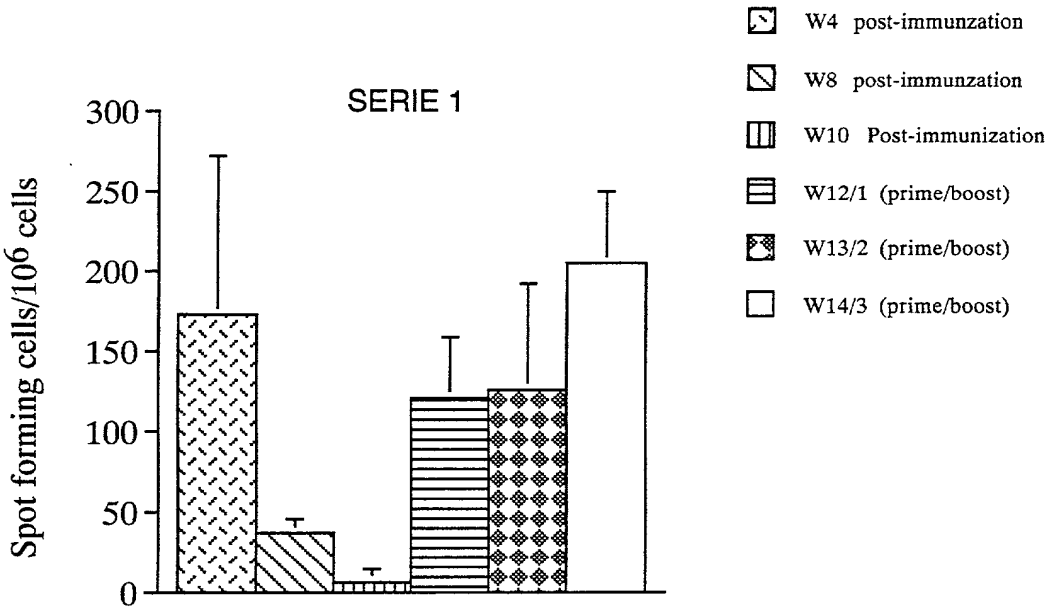

Week 14 post-pjme/week 3
post-boost
A450nm
2
1.5
1
0.5
0
0
1/25600
1/6400
1/1600
1/400
1/100
Serum dilutions
M1
M2
M3
M4

FIGURE 14

Gag-specific IFNγ secreting splenic cells after immunization of mice with Ad(3C, Gag, Env)

A.



B.

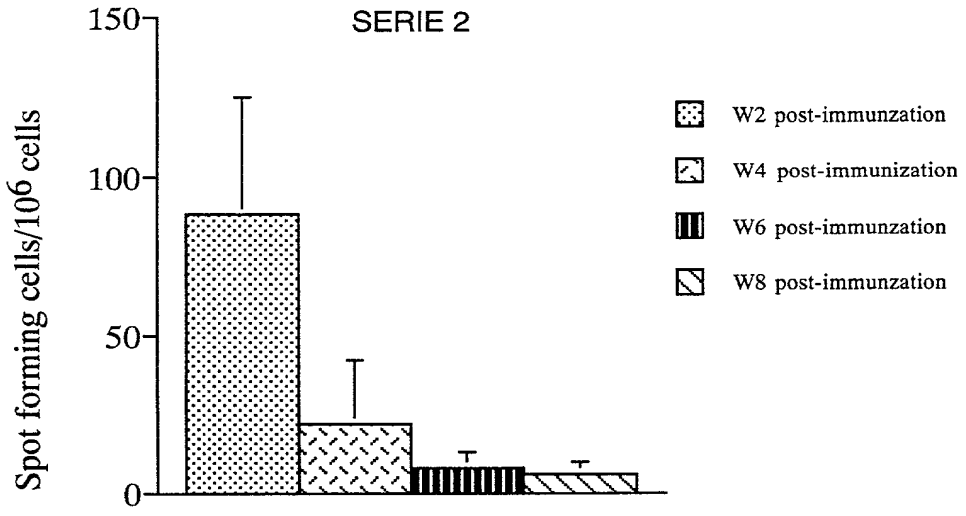


FIGURE 15 L23: ELISPOT for IFNγ secretion: Serie1 spleen cells from mice at week W13/2 (post-prime/boost)

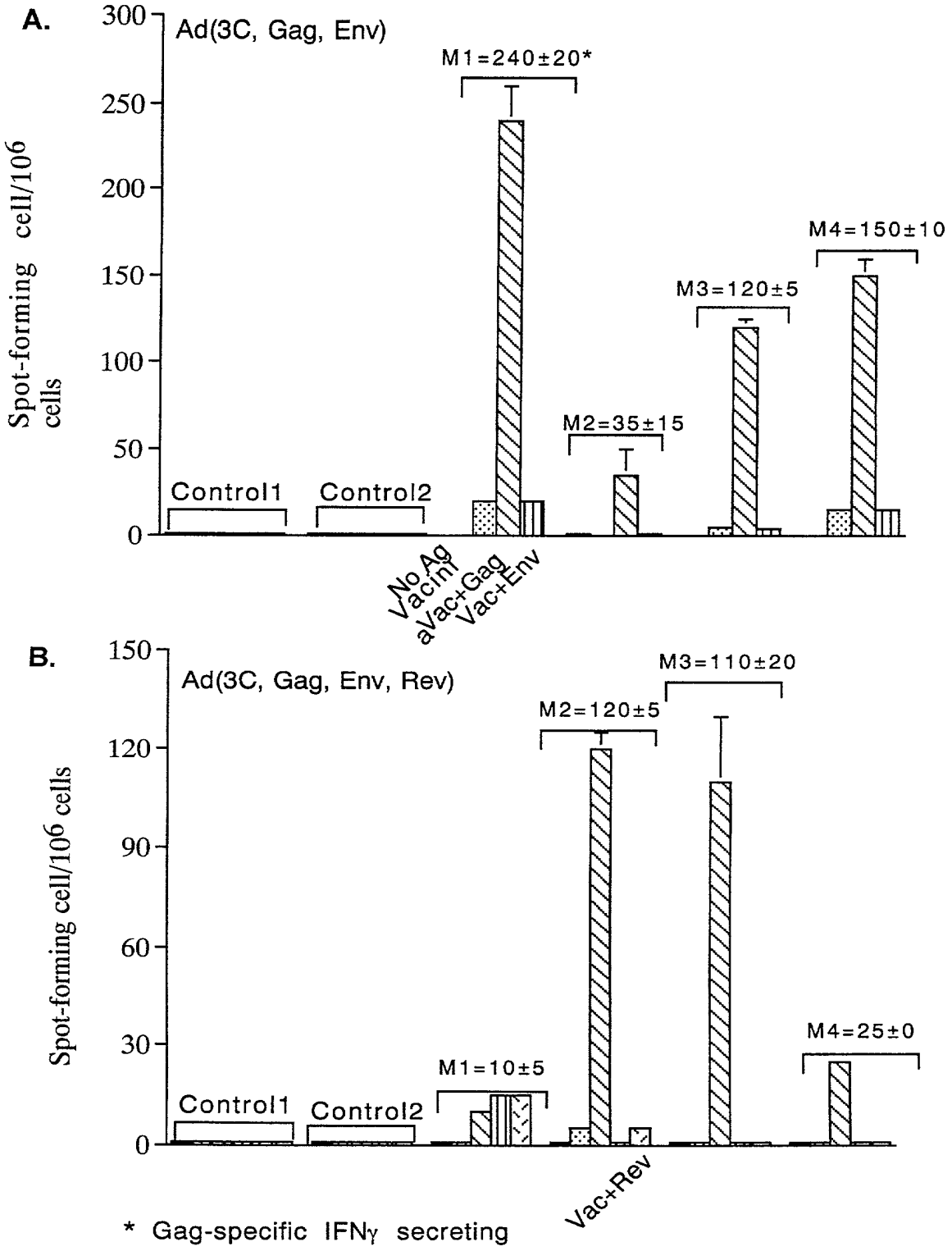
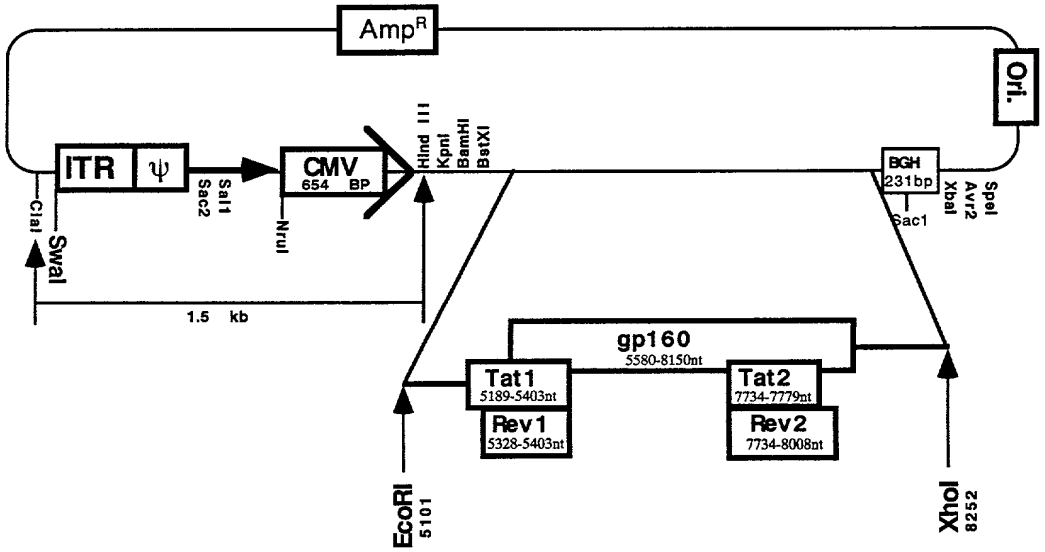


FIGURE 16 Ad-E.T.R/ IL2 (from BH10 strain)

A. pLAd-E.T.R



B. pRAd.ORF6-IL2

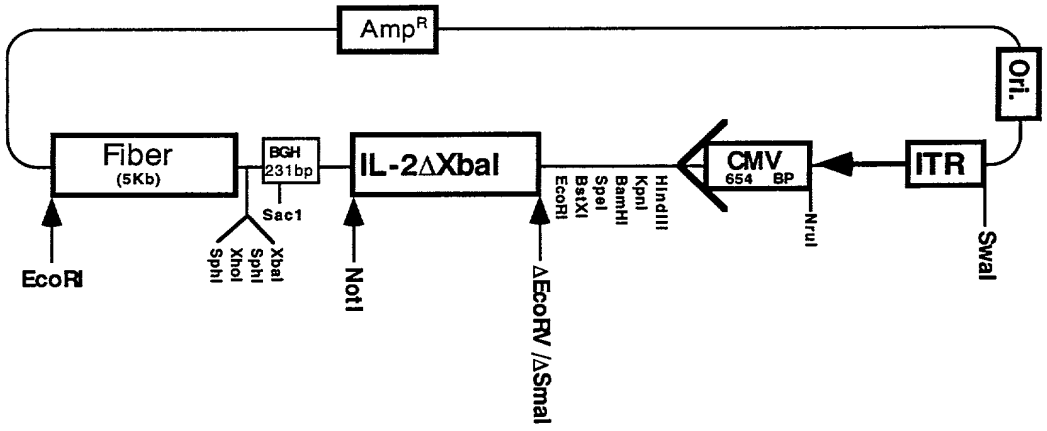
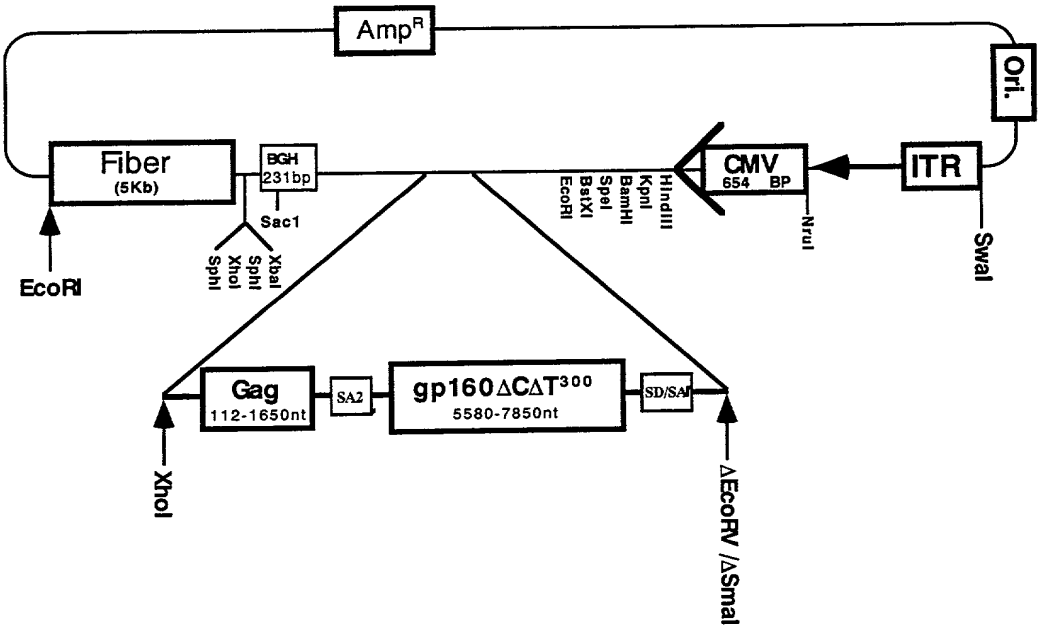


FIGURE 17 Ad-3C/E^{m}ΔCΔT^{300}–G (from BH10 strain)

A. pRAd.ORF6-E^{m}ΔCΔT^{300}–G



B. pLAd-3C

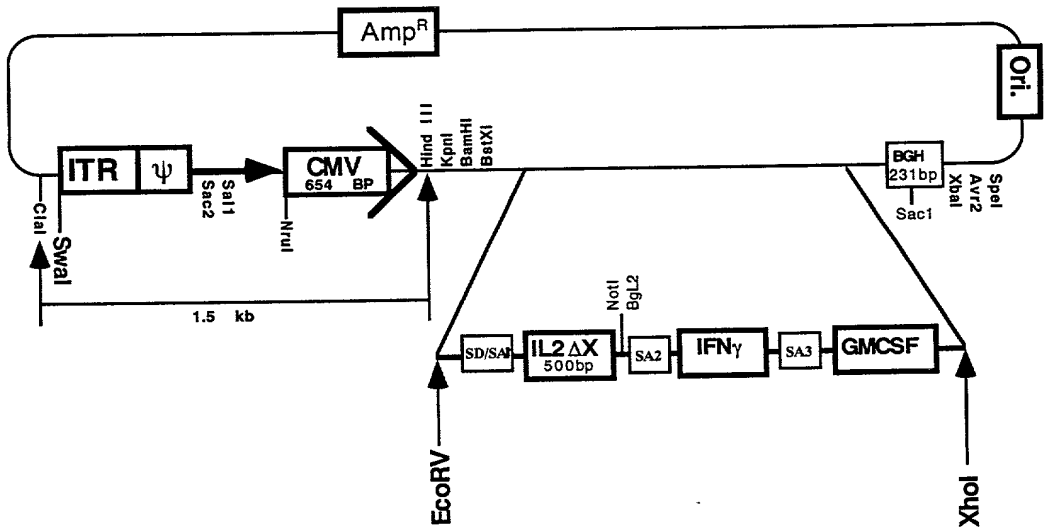


FIGURE 18

pRAd.ORF6-E^{m}ΔCΔT^{99}.T.R-G

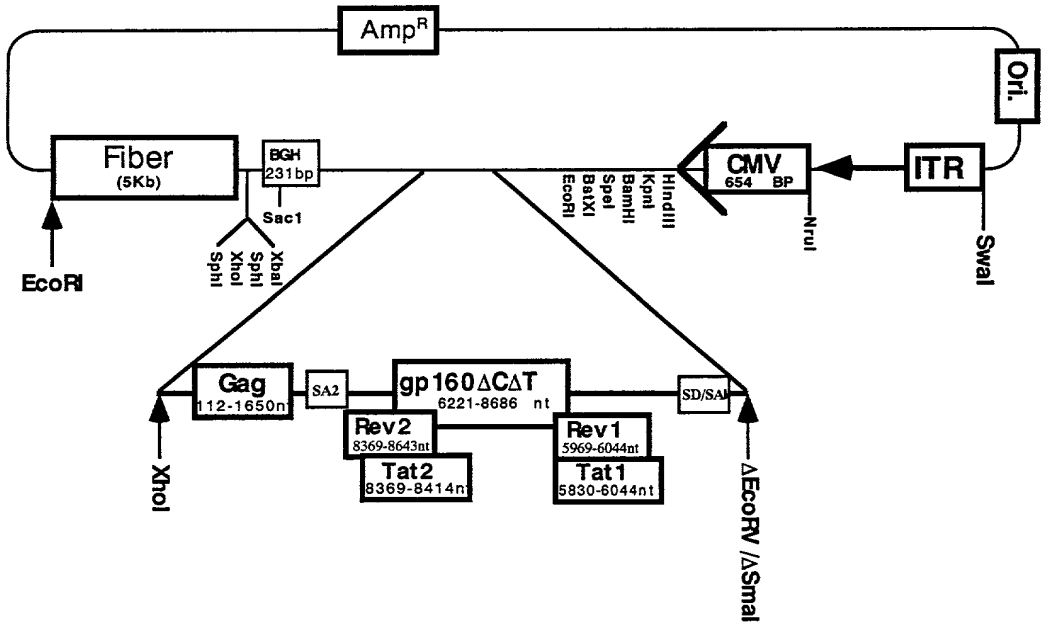
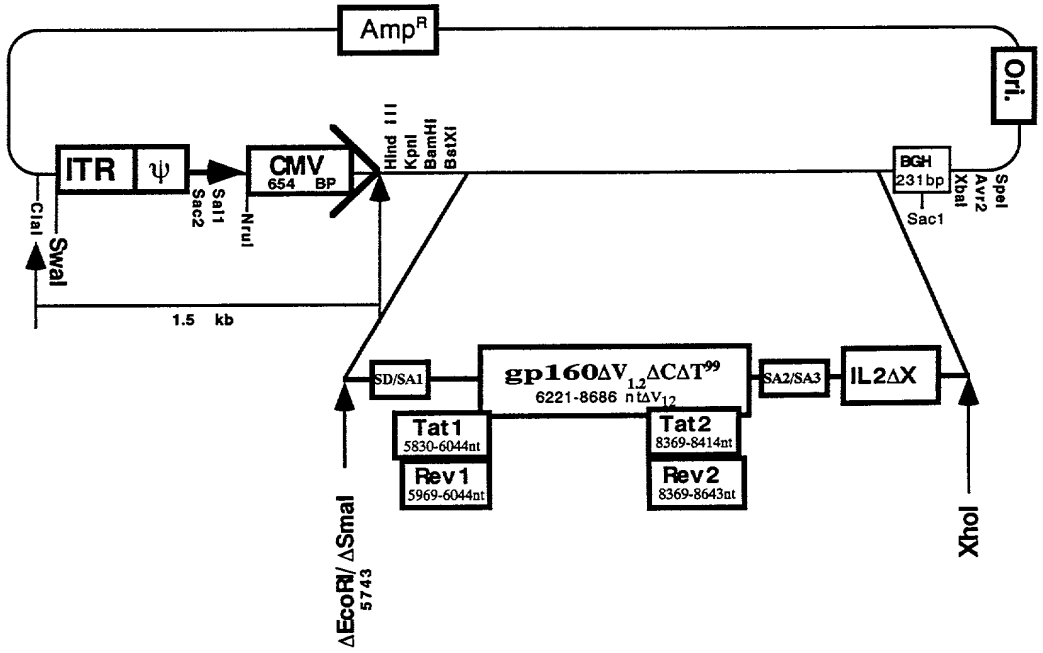


FIGURE 19

A. pLAd-$E^{m}\Delta V_{1.2}\Delta C\Delta T.T.R$-IL2



B. pRAd.ORF6-G.IL2

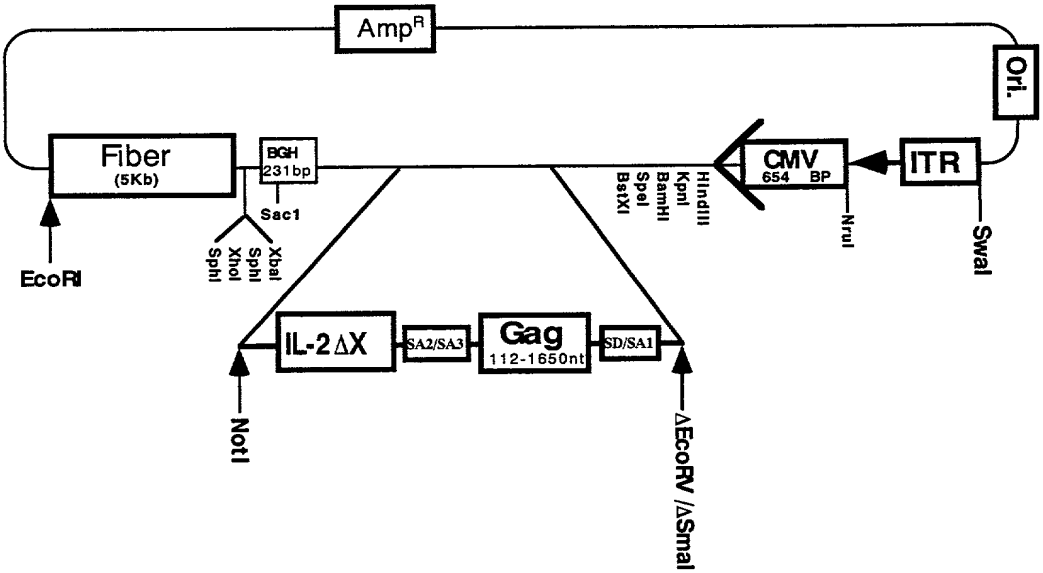


FIGURE 20

pLAd-ETRN

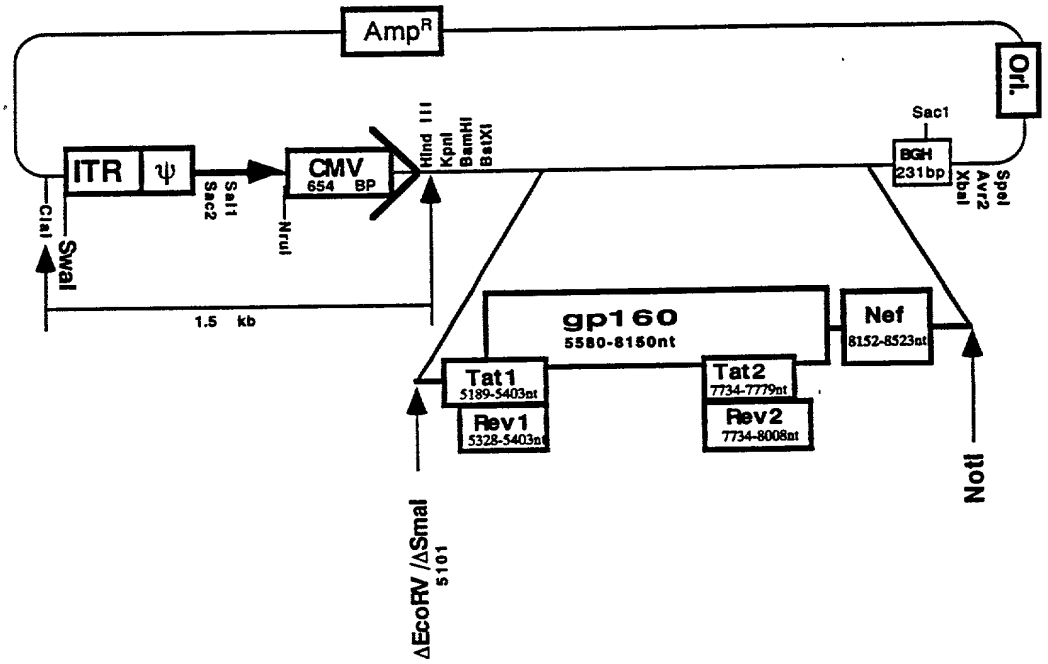


FIGURE 21

pLAd-E^{m}ΔC.N

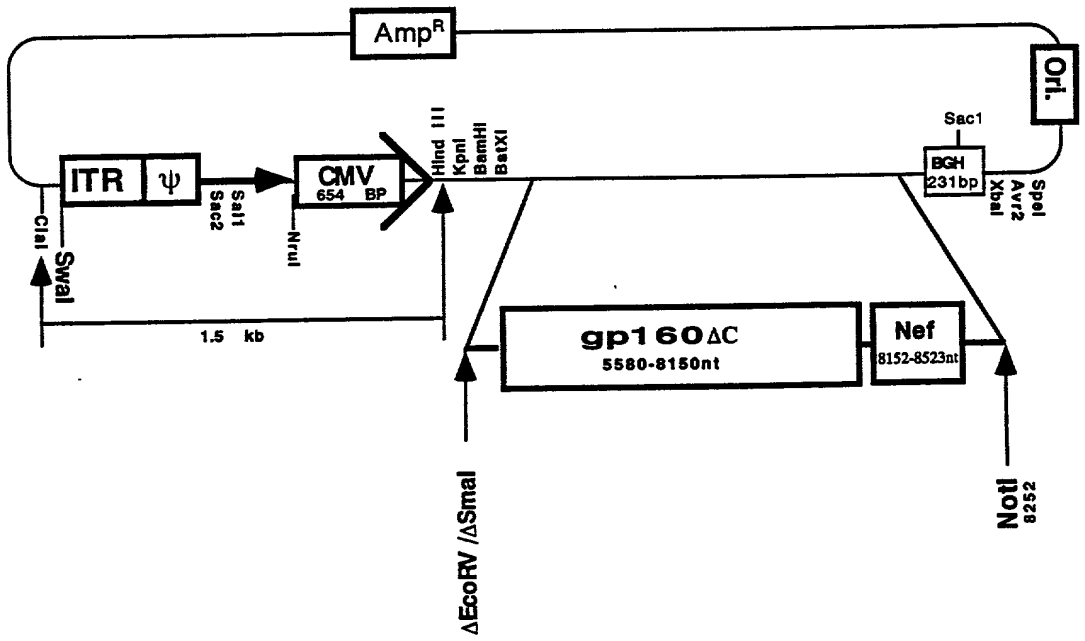


FIGURE 22

pLAd-E^{m}ΔCΔT^{300}.T

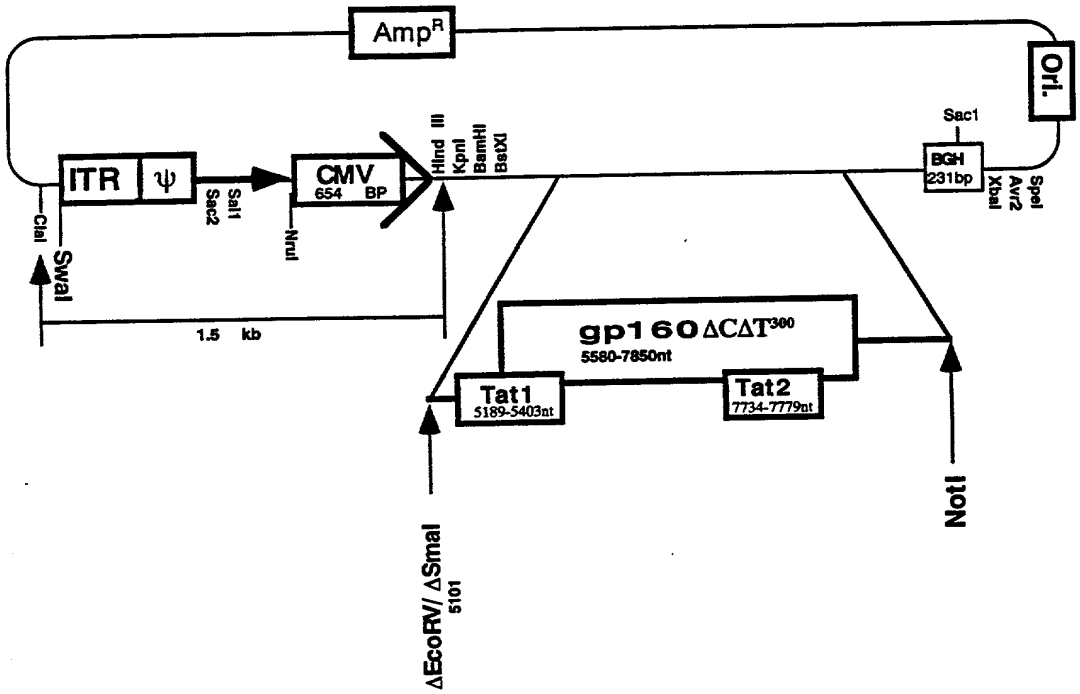
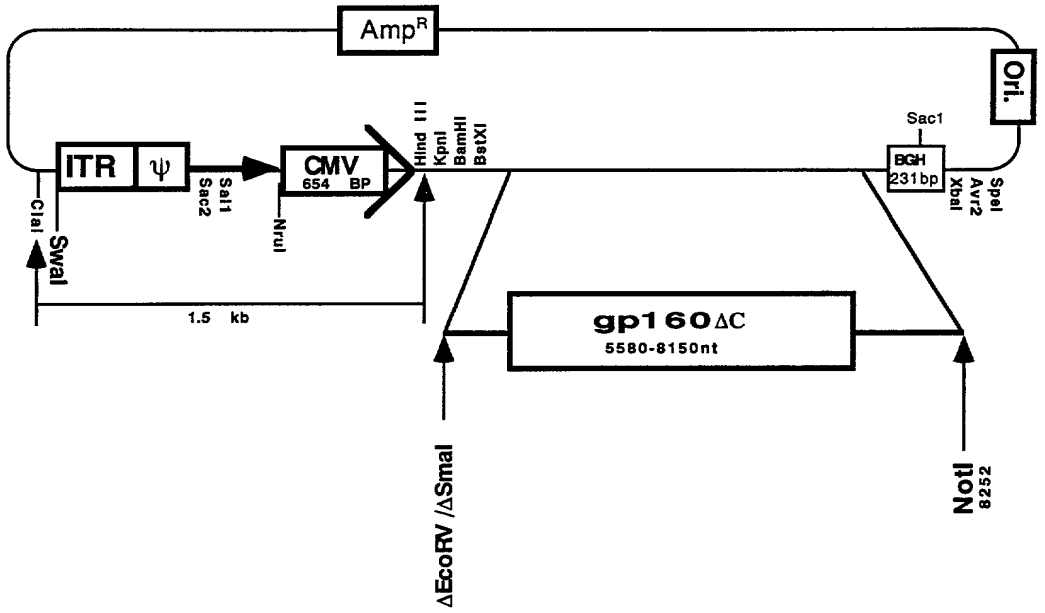


FIGURE 23

A. pLAd-$E^m\Delta C$



B. pRAd.ORF6-$E^m\Delta C$

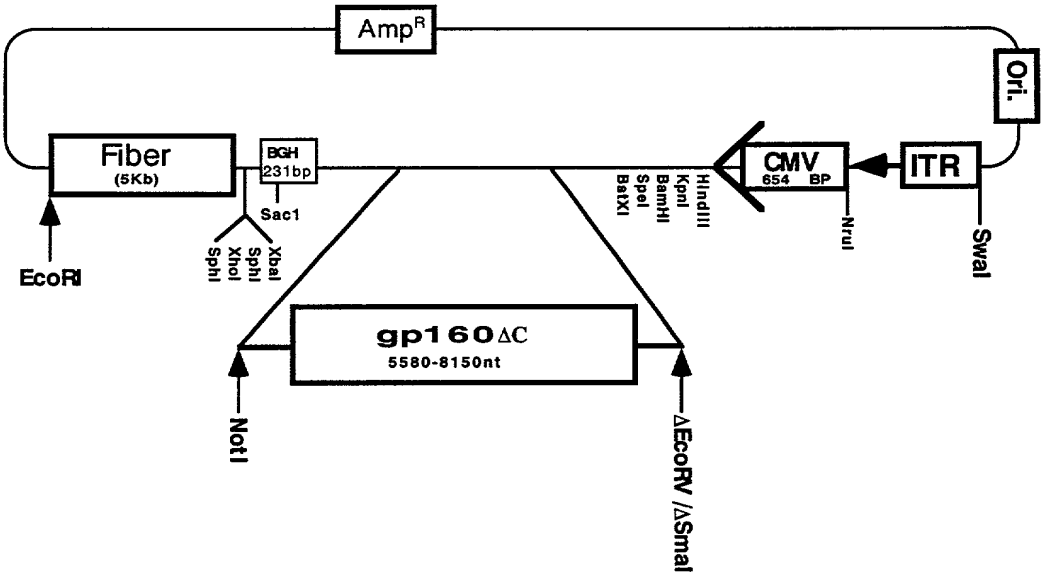
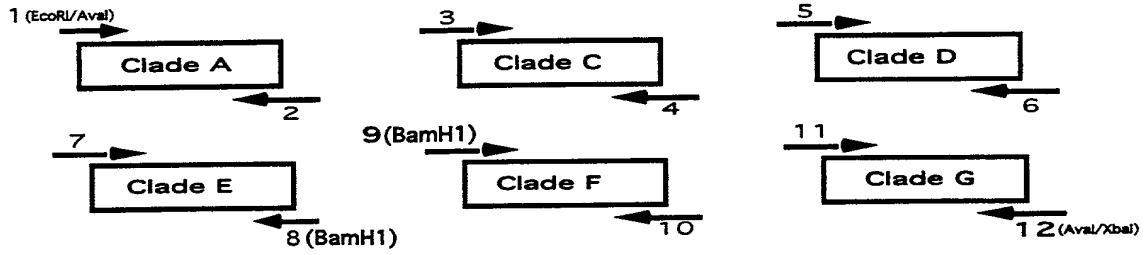
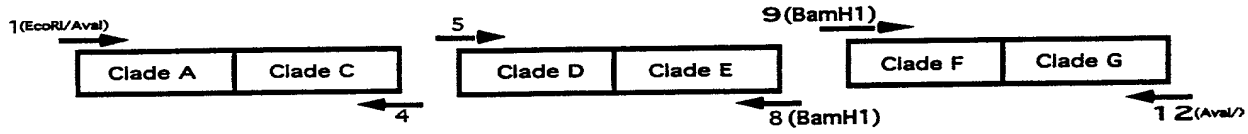


FIGURE 24

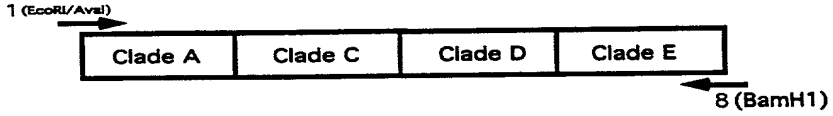
Step 1. Amplification of each individual clade A-G



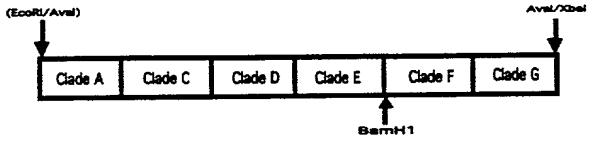
Step 2. Amplification of every two Clades AC, DE, FG



Step 3. Amplification of Clades ACDE



Step 4. Cloning the multi-clades into pSP73 vector



Step 5. Generating of a duplicated multi-clades

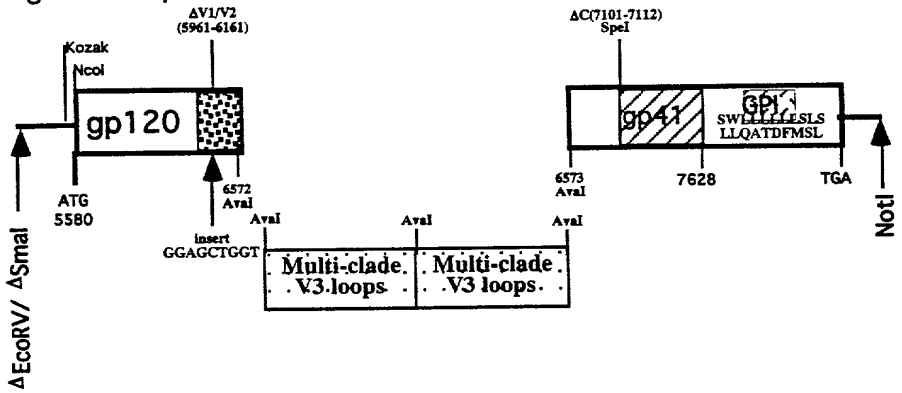


FIGURE 25

pLAd-E^{m}.V3

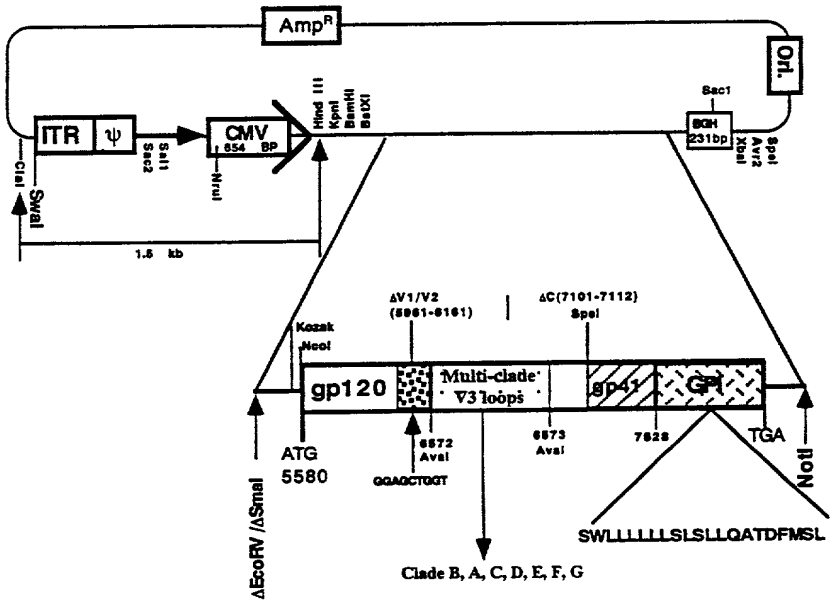


FIGURE 26

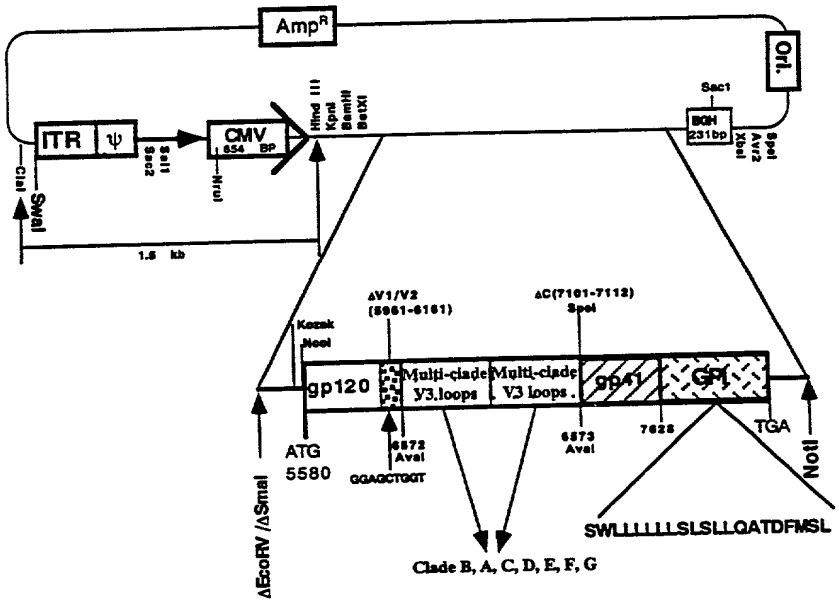
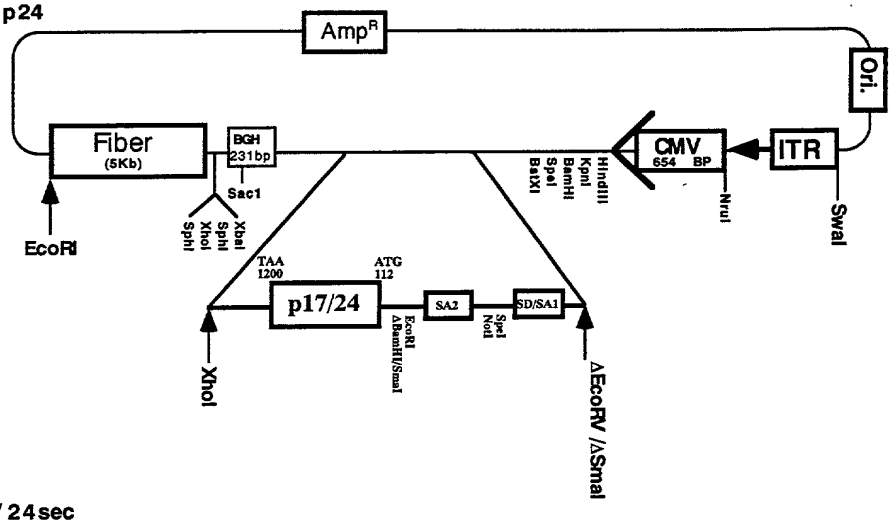
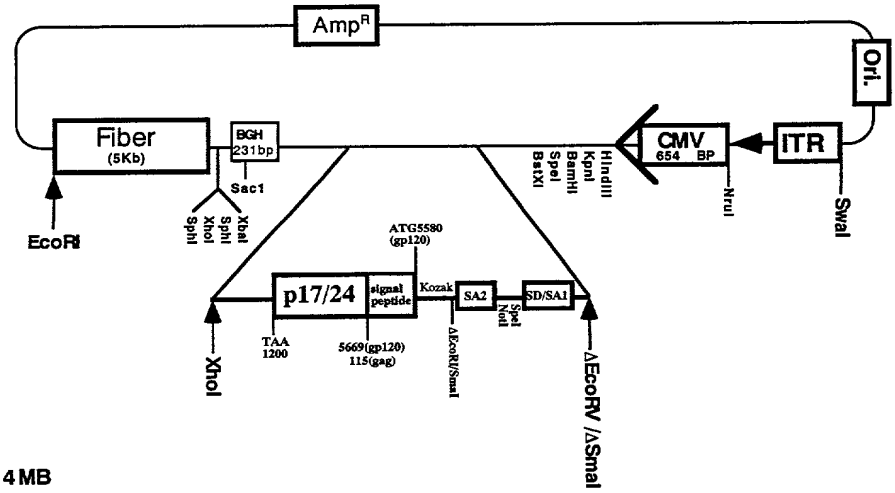


FIGURE 27

A. pRAd.ORF6-p17/p24



B. pRAd.ORF6-p17/24sec



C. pRAd.ORF6-p17/24MB

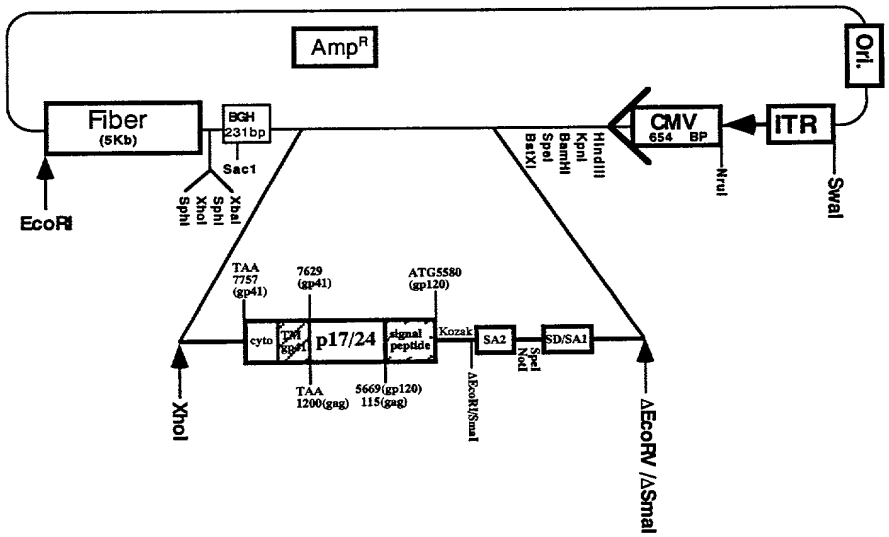
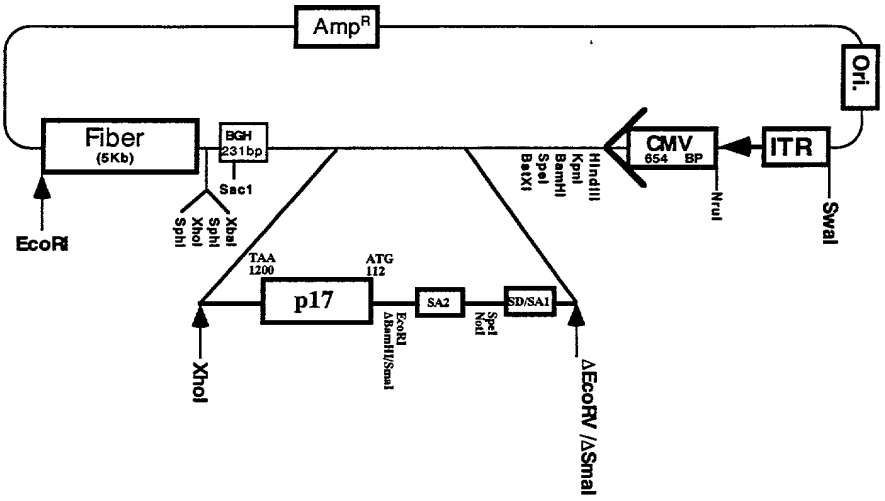
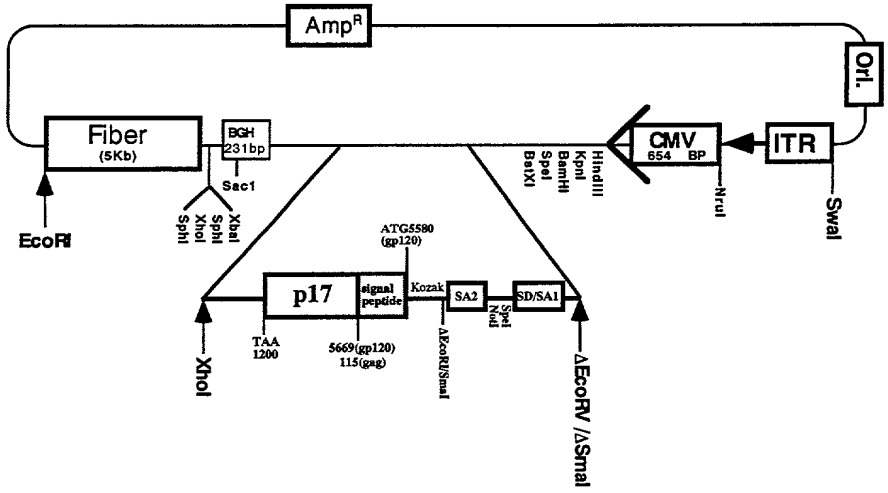


FIGURE 28

A. pRAd.ORF6-p17



B. pRAd.ORF6-p17sec



C. pRAd.ORF6-p17MB

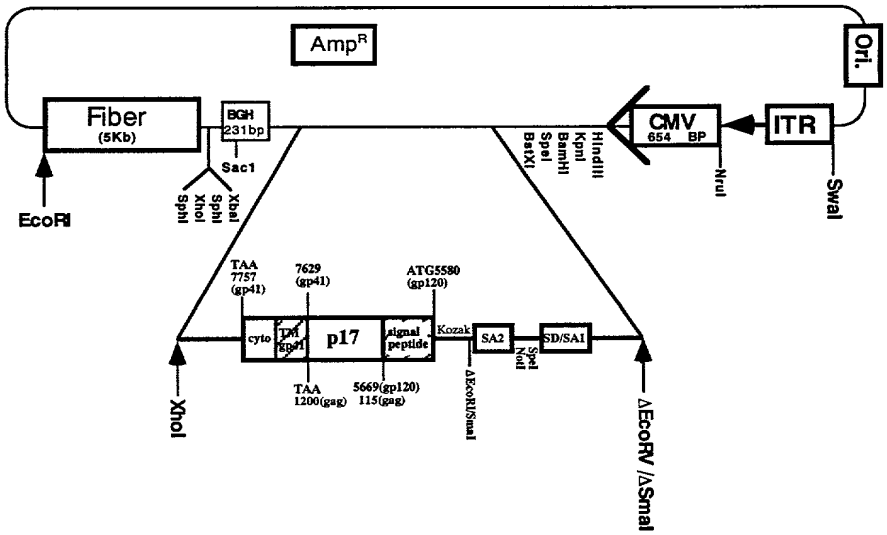
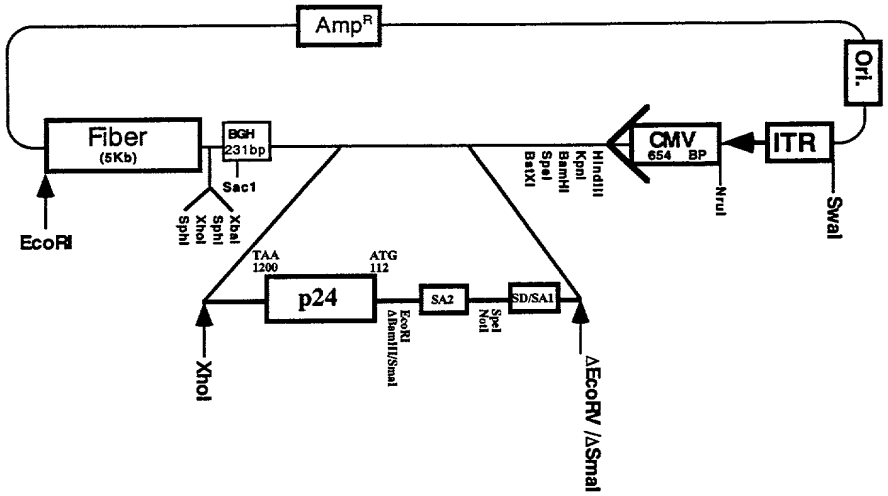
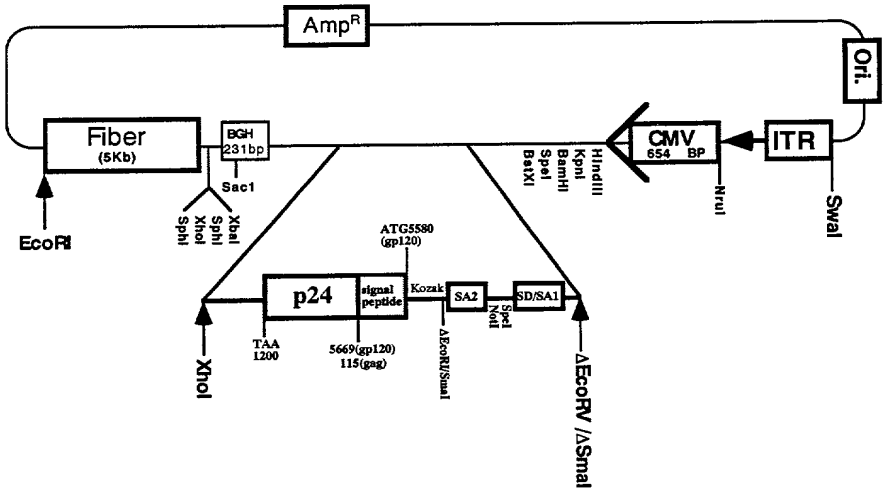


FIGURE 29

A. pRAd.ORF6-p24



B. pRAd.ORF6-p24sec



C. pRAd.ORF6-p24MB

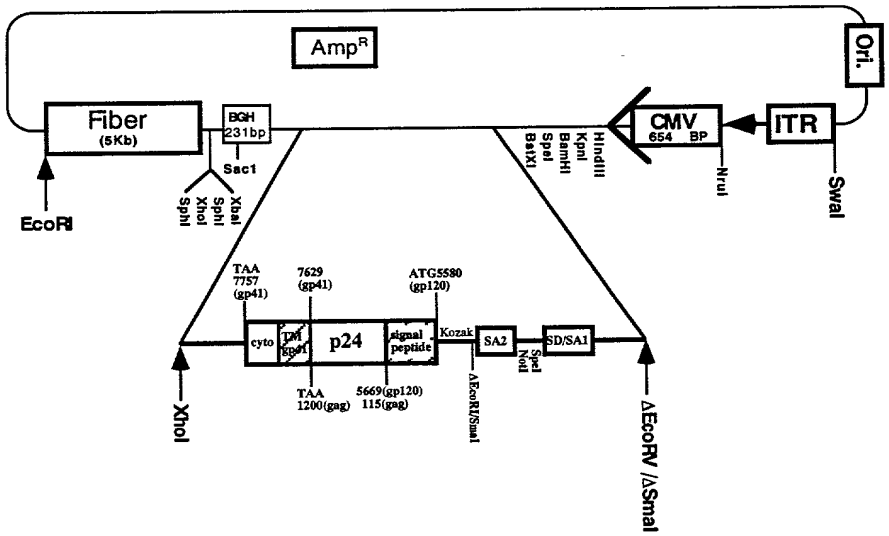


FIGURE 30 Adenoviral construct of Ad-$E^m.V3^m$/p17/24MB

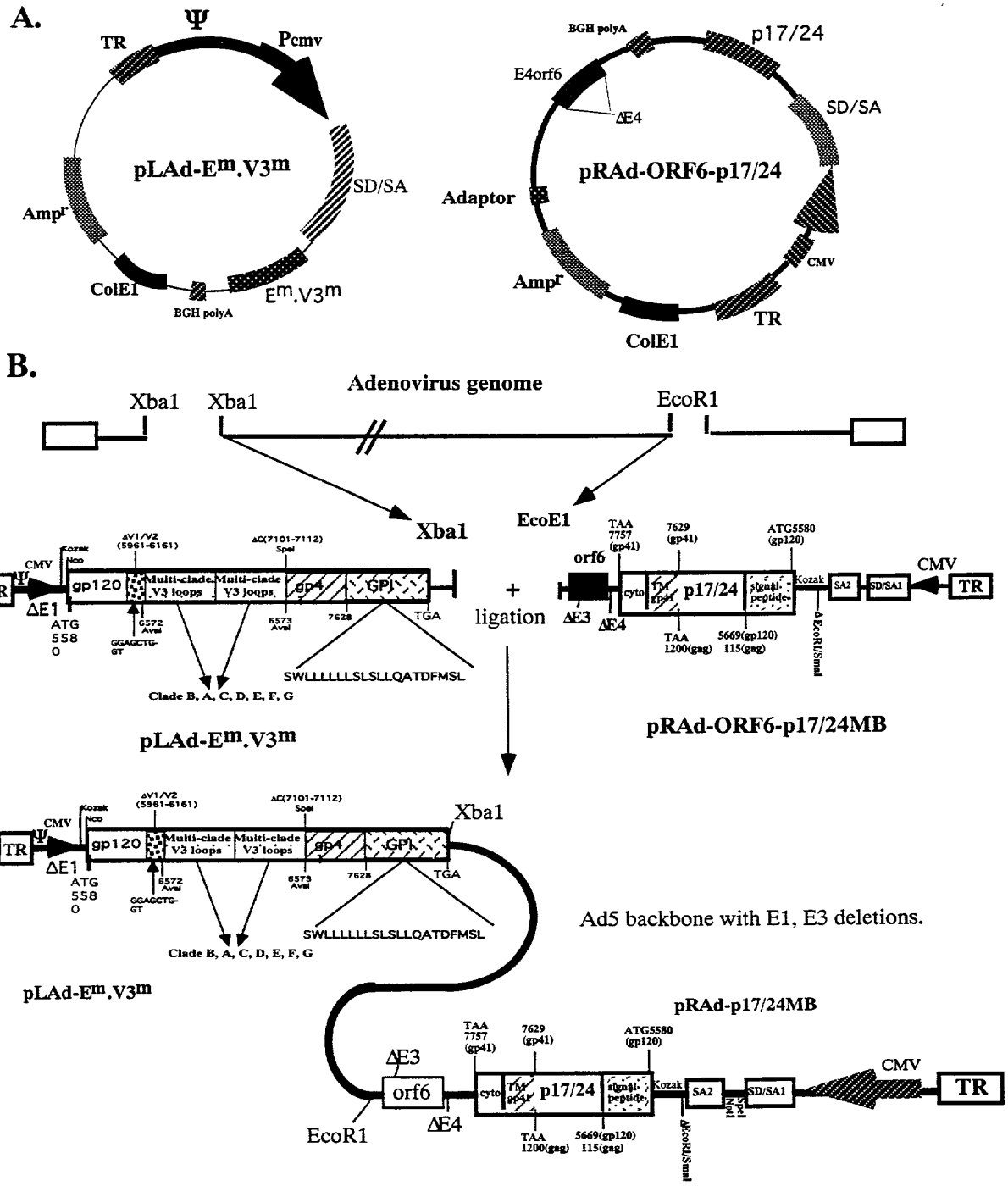


FIGURE 31 Adenoviral construct of Ad-E^{m}.V3^{m}/p17MB

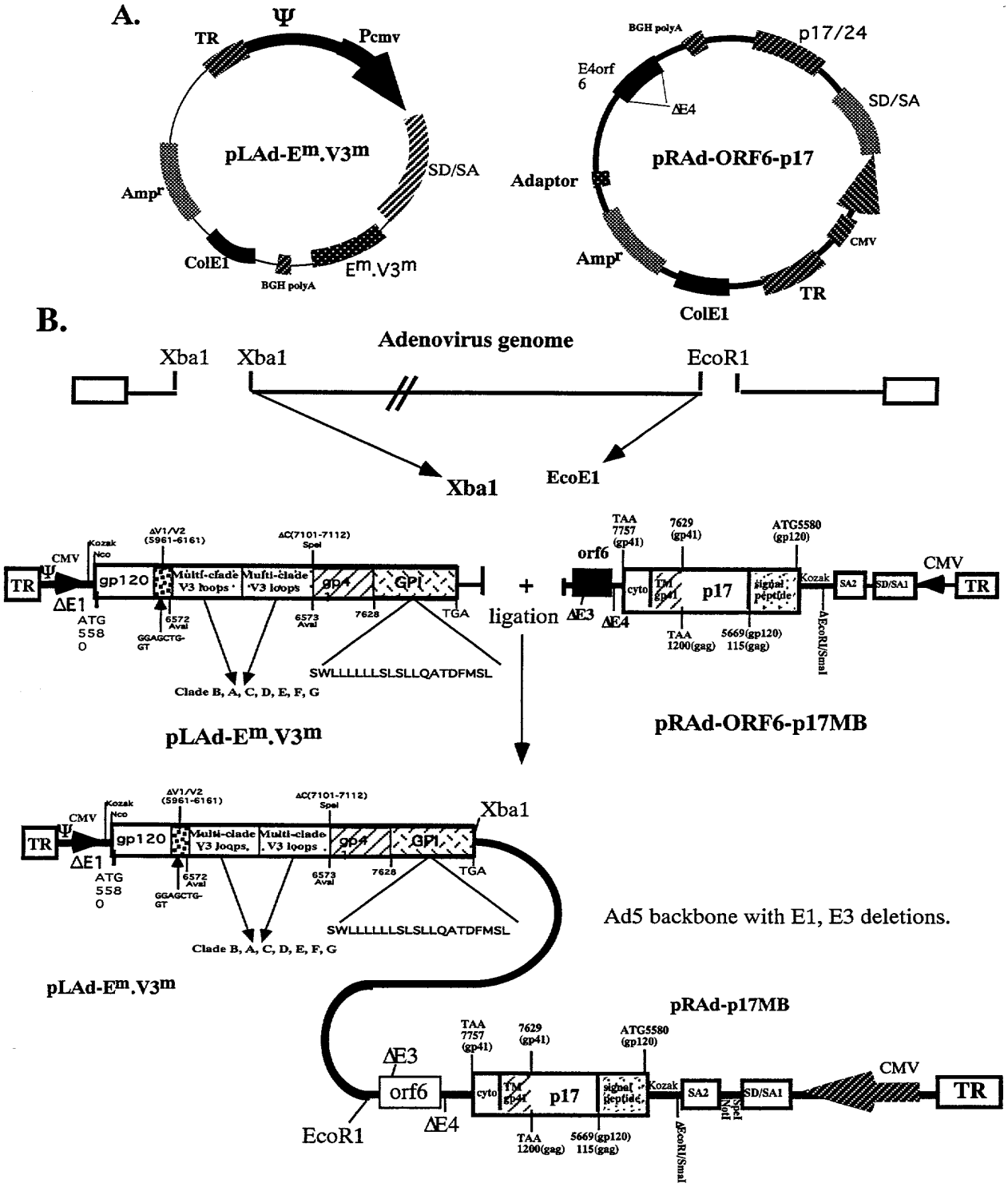


FIGURE 32 Adenoviral construct of Ad-$E^m.V3^m$/p24MB

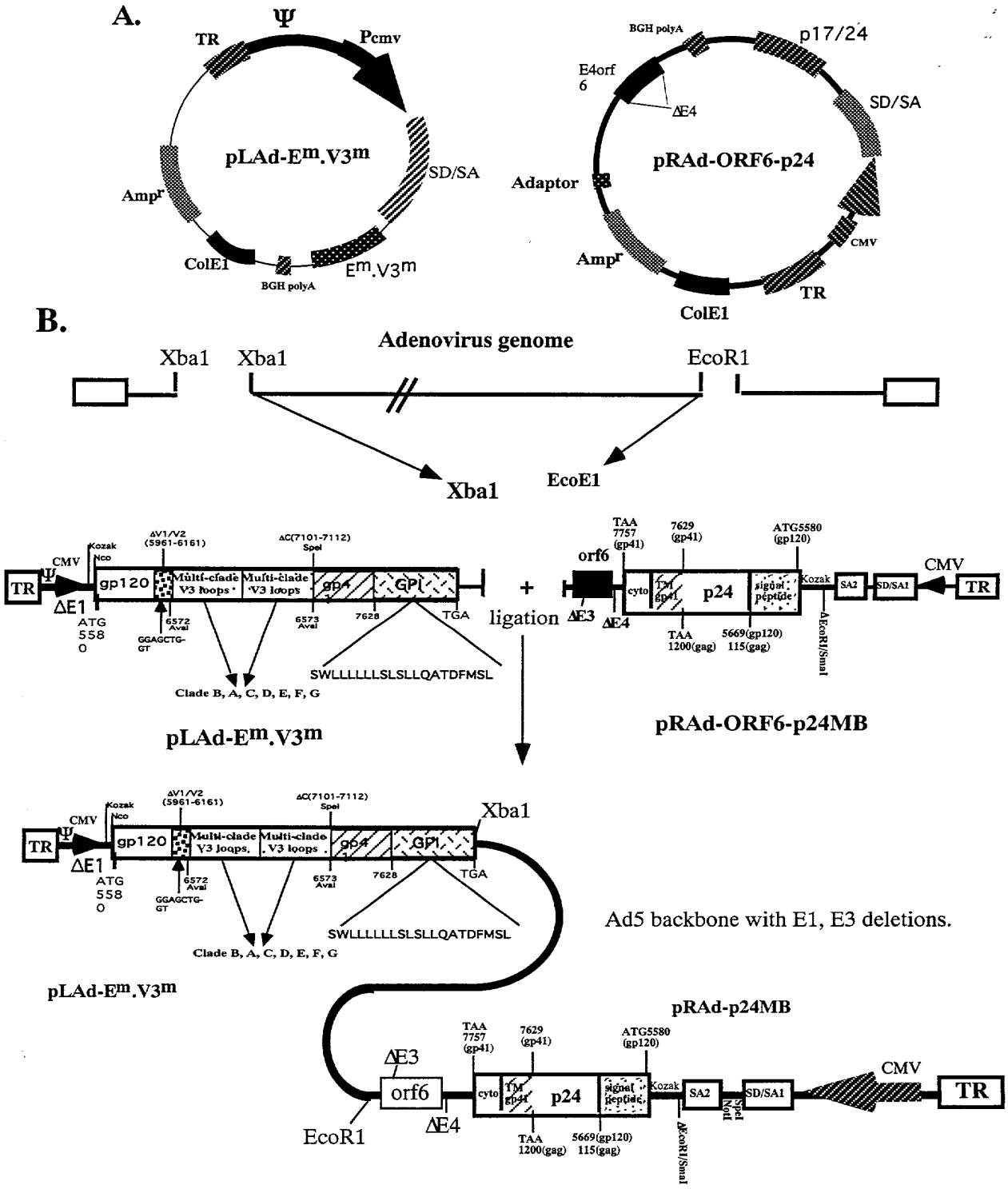


FIGURE 33

pLAd-E^{m}ΔCΔT^{300}.V3^{m}.T.

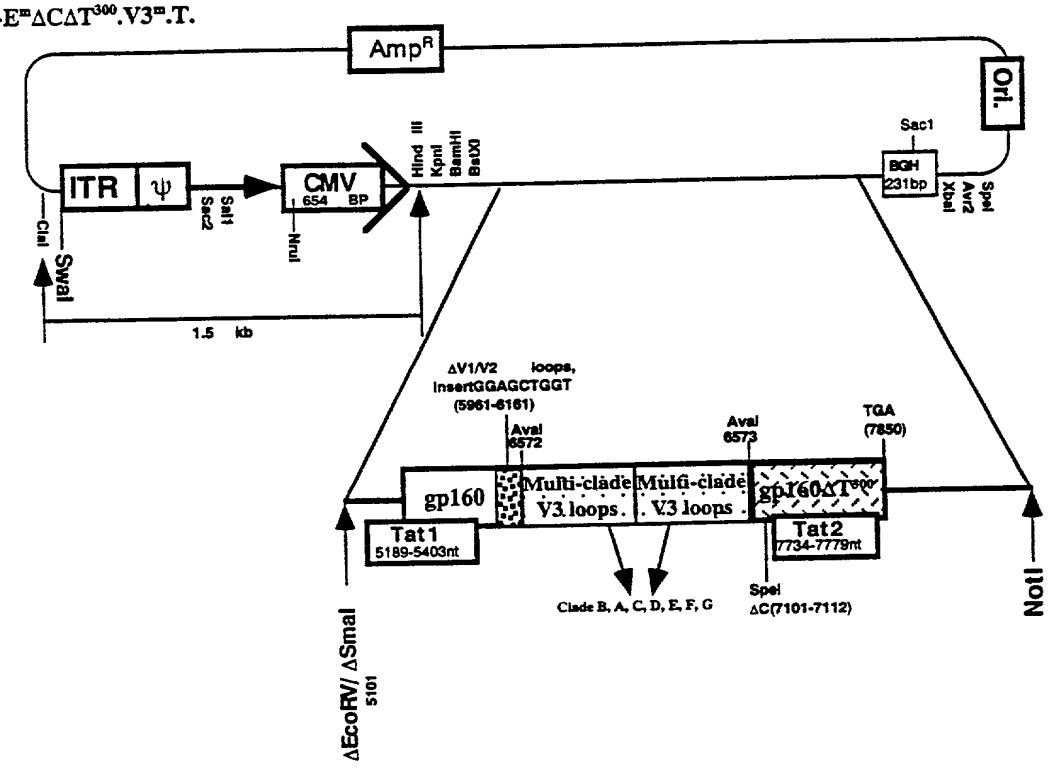
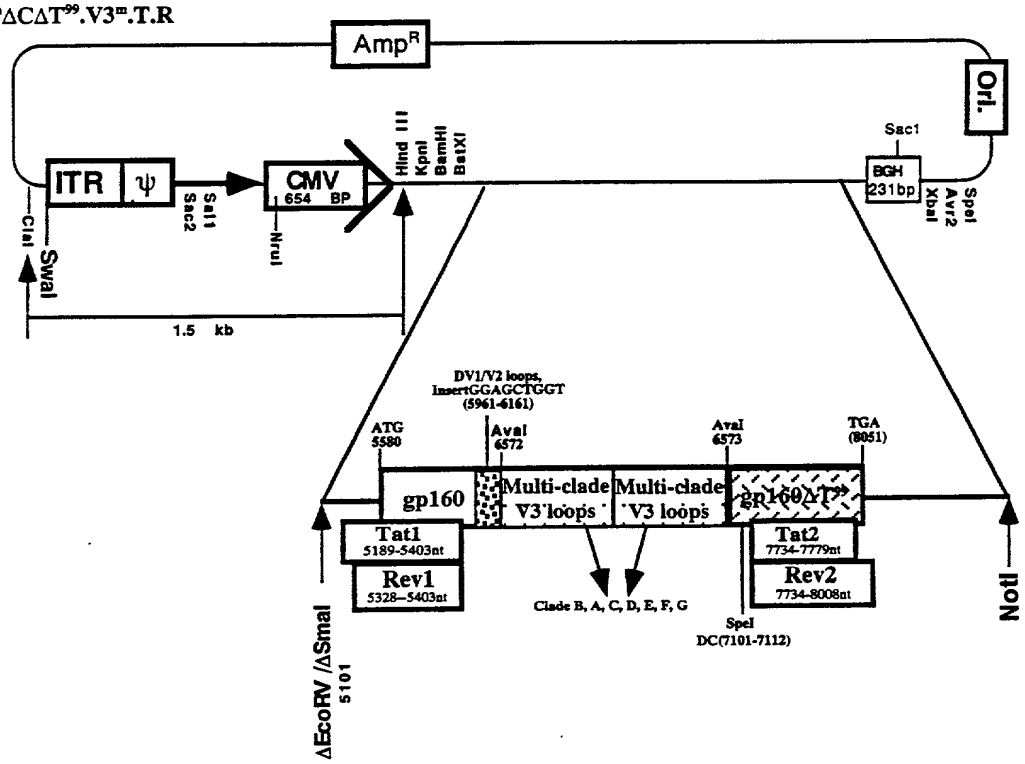


FIGURE 34

pLAd-E^{m}ΔCΔT^{99}.V3^{m}.T.R



pRAd.ORF6-G.PI

FIGURE 35

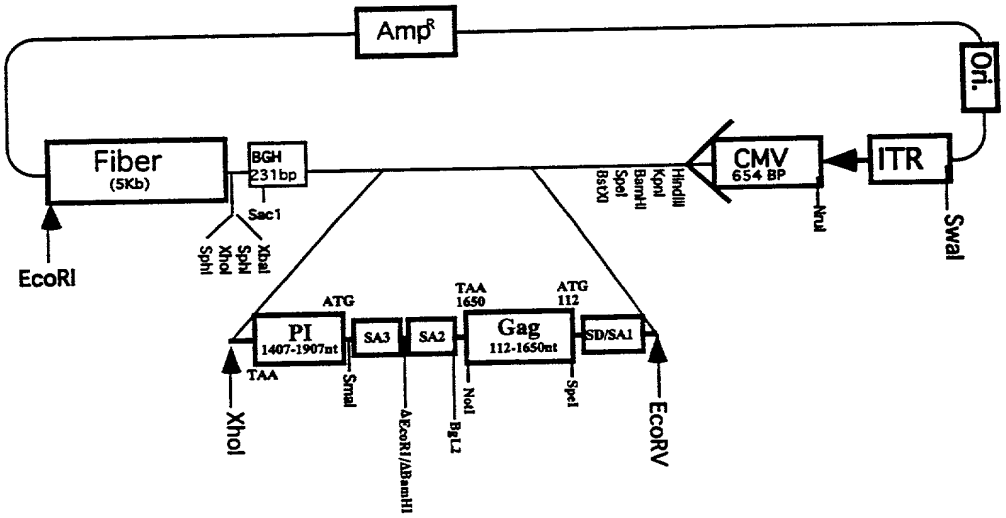


FIGURE 36

pRAd.ORF6-G-PI

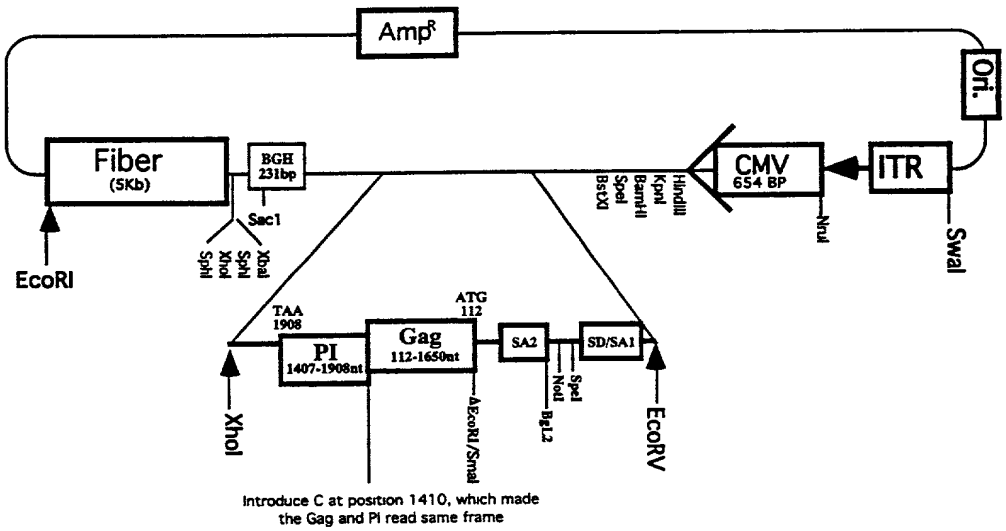


FIGURE 37

SD/SA1.2.3 vector

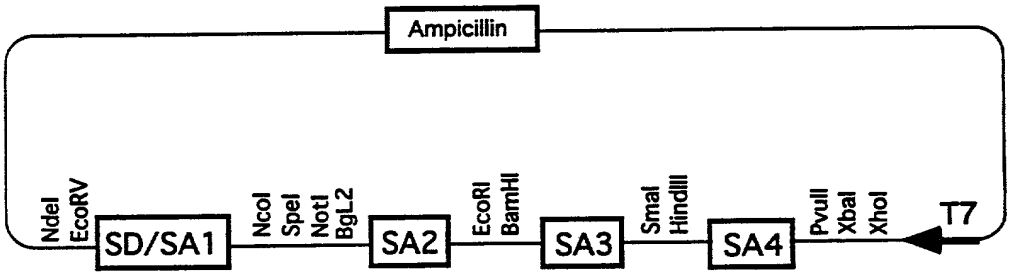


FIGURE 38

DNA Sequence of Env/Tat/Rev from BH10 clone [SEQ ID NO: 14]:

Gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacat
EcoRI
agcagaataggcgttactcgacagaggagagcaagaaatggagccagtagatcctagactagagccctgga
agcatccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaaagtgttgctttcattgccaa
gtttgtttcataacaaaagccttaggcatctcctatggcaggaagaagcggagacagcgacgaagacctcc
tcaaggcagtcagactcatcaagtttctctatcaaagcagtaagtagtacatgtaatgcaacctatacaaa
tagcaatagtagcattagtagtagcaataataatagcaatagttgtgtggtccatagtaatcatagaatat
aggaaaatattaagacaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagacagtgg
caatgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatggggcaccatgctccttggg
atgttgatgatctgtagtgctacagaaaaattgtgggtcacagtctattatggggtacctgtgtggaagga
agcaaccaccactctattttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggcca
cacatgcctgtgtacccacagaccccaacccacaagaagtagtattggtaaatgtgacagaaaattttaac
atgtggaaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaagcctaaagcc
atgtgtaaaattaaccccactctgtgttagtttaaagtgcactgatttgaagaatgatactaataccaata
gtagtagcgggagaatgataatggagaaaggagagataaaaaactgctctttcaatatcagcacaagcata
agaggtaaggtgcagaaagaatatgcatttttttataaacttgatataataccaatagataatgatactac
cagctatacgttgacaagttgtaacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaa
ttcccatacattattgtgccccggctggttttgcgattctaaaatgtaataataagacgttcaatggaaca
ggaccatgtacaaatgtcagcacagtacaatgtacacatggaattaggccagtagtatcaactcaactgct
gttaaatggcagtctggcagaagaagaggtagtaattagatctgccaatttcacagacaatgctaaaacca
taatagtacagctgaaccaatctgtagaaattaattgtacaagacccaacaacaatacaagaaaaagtatc
cgtatccagagaggaccagggagagcatttgttacaataggaaaaataggaaatatgagacaagcacattg
taacattagtagagcaaaatggaataacactttaaaacagatagatagcaaattaagagaacaatttggaa
ataataaaacaataatctttaagcagtcctcaggaggggacccagaaattgtaacgcacagttttaattgt
ggaggggaatttttctactgtaattcaacacaactgtttaatagtacttggtttaatagtacttggagta
ctaaagggtcaaataacactgaaggaagtgacacaatcaccctcccatgcagaataaaacaaattataaac
atgtggcaggaagtaggaaaagcaatgtatgcccctcccatcagtggacaaattagatgttcatcaaatat
tacagggctgctattaacaagagatggtggtaatagcaacaatgagtccgagatcttcagacctggaggag
gagatatgagggacaattggagaagtgaattatataaatataaagtagtaaaaattgaaccattaggagta
gcacccaccaaggcaaagagaagagtggtgcagagagaaaaaagagcagtgggaataggagctttgttcct
tgggttcttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagacaat
tattgtctggtatagtgcagcagcagaacaatttgctgagggctattgaggcgcaacagcatctgttgcaa
ctcacagtctggggcatcaagcagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaaca
gctcctggggatttggggttgctctggaaaactcatttgcaccactgctgtgccttggaatgctagttgga
gtaataaatctctggaacagatttggaataacatgacctggatggagtgggacagagaaattaacaattac
acaagcttaatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattgga
attagataaatgggcaagtttgtggaattggtttaacataacaaattggctgtggtatataaaattattca
taatgatagtaggaggcttggtaggtttaagaatagtttttgctgtactttctgtagtgaatagagttagg
cagggatattcaccattatcgtttcagacccacctcccaatcccgaggggacccgacaggcccgaaggaat
agaagaagaaggtggagagagagacagagacagatccattcgattagtgaacggatccttagcacttatct
gggacgatctgcggagcctgtgcctcttcagctaccaccgcttgagagacttactcttgattgtaacgagg
attgtggaacttctgggacgcaggggtgggaagccctcaaatattggtggaatctcctacagtattggag
tcaggagctaaagaatagtgctgttagcttgctcaatgccacagctatagcagtagctgaggggacagata
gggttatagaagtagtacaaggagcttatagagctattcgccacatacctagaagaataagacagggcttg
gaaaggattttgctataagatgggtggcaagtggtcaaaaagtagtgtggttggatggcctgctgtaaggg
aaagaatgagacgagctgagccagcagcagatggggtgggagcagcatctcgag
XhoI

FIGURE 39

DNA Sequence of IL-2ΔX [SEQ ID NO: 15]:

Tcactctctttaatcactactcacagtaacctcaactcctgccacaatgta
caggatgcaactcctgtcttgcattgcactaagtcttgcacttgtcacaaa
cagtgcacctacttcaagttctacaaagaaaacacagctacaactggagca
tttactgctggatttacagatgattttgaatggaattaataattacaagaa
tcccaaactcaccaggatgctcacatttaagttttacatgcccaagaaggc
cacagaactgaaacatcttcagtgtct**t**gaagaagaactcaaacctctgga
ΔXbaI (cta → ctt)
ggaagtgctaaatttagctcaaagcaaaaactttcacttaagacccaggga
cttaatcagcaatatcaacgtaatagttctggaactaaagggatctgaaac
aacattcatgtgtgaatatgctgatgagacagcaaccattgtagaatttct
gaacagatggattacctttgtcaaagcatcatctcaacactaacttga

FIGURE 40

DNA Sequence of $Env^{m}\Delta C\Delta T^{300}$ (HIV strain BH10) [SEQ ID NO: 16]:

Gaattcgcca**ccatgg**gagtgaaggagaaatatcagcacttgtggagatg
EcoRI Kozak NcoI
ggggtggagatggggcaccatgctccttgggatgttgatgatctgtagtgctacagaaaaa
ttgtgggtcacagtctattatggggtacctgtgtggaaggaagcaaccaccactctatttt
gtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggccacacatgcctg
tgtacccacagaccccaacccacaagaagtagtattggtaaatgtgacagaaaattttaac
atgtggaaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaa
gcctaaagccatgtgtaaaattaaccccactctgtgttagtttaaagtgcactgatttgaa
gaatgatactaataccaatagtagtagcgggagaatgataatggagaaaggagagataaaa
aactgctctttcaatatcagcacaagcataagaggtaaggtgcagaaagaatatgcatttt
tttataaacttgatataataccaatagataatgatactaccagctatacgttgacaagttg
taacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaattcccatacat
tattgtgccccggctggttttgcgattctaaaatgtaataataagacgttcaatggaacag
gaccatgtacaaatgtcagcacagtacaatgtacacatggaattaggccagtagtatcaac
tcaactgctgttaaatggcagtctggcagaagaagaggtagtaattagatctgccaatttc
acagacaatgctaaaaccataatagtacagctgaaccaatctgtagaaattaattgtacaa
gacccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttgt
tacaataggaaaaataggaaatatgagacaagcacattgtaacattagtagagcaaaatgg
aataacactttaaaacagatagatagcaaattaagagaacaatttggaaataataaaacaa
taatctttaagcagtcctcaggaggggacccagaaattgtaacgcacagttttaattgtgg
aggggaatttttctactgtaattcaacacaactgtttaatagtacttggtttaatagtact
tggagtactaaagggtcaaataacactgaaggaagtgacacaatcaccctcccatgcagaa
taaaacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgcccctcccatcag
tggacaaattagatgttcatcaaatattacagggctgctattaacaagagatggtggtaat
agcaacaatgagtccgagatcttcagacctggaggaggagatatgagggacaattggagaa
gtgaattatataaatataaagtagtaaaaattgaaccattaggagtagcacccaccaaggc
aaagagaagagtggtgcag**ACTAGT**gcagtgggaataggagctt
ΔCleavage site(**agagaaaaaaga**)→SpeI
tgttccttgggttcttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgac
ggtacaggccagacaattattgtctggtatagtgcagcagcagaacaatttgctgagggct
attgaggcgcaacagcatctgttgcaactcacagtctggggcatcaagcagctccaggcaa
gaatcctggctgtggaaagatacctaaaggatcaacagctcctggggatttggggttgctc
tggaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaatctctg
gaacagatttggaataacatgacctggatggagtgggacagagaaattaacaattacacaa
gcttaatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaatt
attggaattagataaatgggcaagtttgtggaattggtttaacataacaaattggctgtgg
tatataaaattattcataatgatagtaggaggcttggtaggtttaagaatagtttttgctg
tactttctgtagtgaatagagttaggcagggatattcaccattatcgtttcagacccacct
cccaatcccgaggggacccgacaggcccgaaggaatagaagaagaaggtggagagagagac
agagacagatccattcgattagtgaacggatccttagcacttatctgg**taa**

FIGURE 41A

DNA Sequence of Full length HIV-1 Gag [SEQ ID NO: 17]:

ggctagaaggagagaggatgggtgcgagagcgtcagtattaagcgggggag
aattagatcgatgggaaaaaattcggttaaggccagggggaaagaaaaaat
ataaattaaaacatatagtatgggcaagcagggagctagaacgactacaac
catcccttcagacaggatcagaagaacttagatcattatataatacagtag
caaccctctattgtgtgcatcaaaggatagagataaaagacaccaaggaag
ctttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagc
aagcagcagctgacacaggacacagcagtcaggtcagccaaaattacccta
tagtgcagaacatccaggggcaaatggtacatcaggccatatcacctagaa
ctttaaatgcatgggtaaaagtagtagaagagaaggctttcagcccagaag
taatacccatgttttcagcattatcagaaggagccaccccacaagatttaa
acaccatgctaaacacagtgggggggacatcaagcagccatgcaaatgttaa
aagagaccatcaatgaggaagctgcagaatgggatagagtacatccagtgc
atgcagggcctattgcaccaggccagatgagagaaccaaggggaagtgaca
tagcaggaactactagtacccttcaggaacaaataggatggatgacaaata
atccacctatcccagtaggagaaatttataaaagatggataatcctgggat
taaataaaatagtaagaatgtatagccctaccagcattctggacataagac
aaggaccaaaagaacccttttagagactatgtagaccggttctataaaactc
taagagccgagcaagcttcacaggaggtaaaaaattggatgacagaaacct
tgttggtccaaaatgcgaacccagattgtaagactattttaaaagcattgg
gaccagcggctacactagaagaaatgatgacagcatgtcagggagtaggag
gacccggccataaggcaagagttttggctgaagcaatgagccaagtaacaa
atacagctaccataatgatgcagaggcaattttaggaaccaaagaaaga
tggttaagtgtttcaattgtggcaaagaagggcacacagccagaaattgca
gggcccctaggaaaaagggctgttggaaatgtggaaaggaaggacaccaaa
tgaaagattgtactgagagacaggctaatttttttagggaagatctggcctt
cctacaagggaaggccagggaattttcttcagagcagaccagagccaacag
ccccaccatttcttcagagcagaccagagccaacagccccaccagaagaga
gcttcaggtctggggtagagacaacaactccccctcagaagcaggagccga
tagacaaggaactgtatcctttaacttccctcagatcactctttggcaacg
acccctcgtcacaataa

FIGURE 41B

Amino Acid Sequence of HIV-1 (Strain BH10) Gag [SEQ ID NO: 18]:

M	G	A	R	A	S	V	L	S	G	G	E	L	D	R	W	E	K
I	R	L	R	P	G	G	K	K	K	Y	K	L	K	H	I	V	W
A	S	R	E	L	E	R	L	Q	P	S	L	Q	T	G	S	E	E
L	R	S	L	Y	N	T	V	A	T	L	Y	C	V	H	Q	R	I
E	I	K	D	T	K	E	A	L	D	K	I	E	E	E	Q	N	K
S	K	K	K	A	Q	Q	A	A	A	D	T	G	H	S	S	Q	V
S	Q	N	Y	P	I	V	Q	N	I	Q	G	Q	M	V	H	Q	A
I	S	P	R	T	L	N	A	W	V	K	V	V	E	E	K	A	F
S	P	E	V	I	P	M	F	S	A	L	S	E	G	A	T	P	Q
D	L	N	T	M	L	N	T	V	G	G	H	Q	A	A	M	Q	M
L	K	E	T	I	N	E	E	A	A	E	W	D	R	V	H	P	V
H	A	G	P	I	A	P	G	Q	M	R	E	P	R	G	S	D	I
A	G	T	T	S	T	L	Q	E	Q	I	G	W	M	T	N	N	P
P	I	P	V	G	E	I	Y	K	R	W	I	I	L	G	L	N	K
I	V	R	M	Y	S	P	T	S	I	L	D	I	R	Q	G	P	K
E	P	F	R	D	Y	V	D	R	F	Y	K	T	L	R	A	E	Q
A	S	Q	E	V	K	N	W	M	T	E	T	L	L	V	Q	N	A
N	P	D	C	K	T	I	L	K	A	L	G	P	A	A	T	L	E
E	M	M	T	A	C	Q	G	V	G	G	P	G	H	K	A	R	V
L	A	E	A	M	S	Q	V	T	N	T	A	T	I	M	M	Q	R
G	N	F	R	N	Q	R	K	M	V	K	C	F	N	C	G	K	E
G	H	T	A	R	N	C	R	A	P	R	K	K	G	C	W	K	C
G	K	E	G	H	Q	M	K	D	C	T	E	R	Q	A	N	F	L
G	K	I	W	P	S	Y	K	G	R	P	G	N	F	L	Q	S	R
P	E	P	T	A	P	P	F	L	Q	S	R	P	E	P	T	A	P
P	E	E	S	F	R	S	G	V	E	T	T	T	P	P	Q	K	Q
E	P	I	D	K	E	L	Y	P	L	T	S	L	R	S	L	F	G
N	D	P	S	S	Q	*											

FIGURE 42

DNA Sequence of $E^{m}\Delta C\Delta T^{99}$.T.R (HIV strain pNL4-3) [SEQ ID NO: 19]:

Gaattctgcaacaactgctgtttatccatttcagaattgggtgtcgacatag
EcoRI
cagaataggcgttactcgacagaggagagcaagaaatggagccagtagatcctagactagagccctggaagca
tccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaaagtgttgctttcattgccaagtttgt
ttcatgacaaaagccttaggcatctcctatggcaggaagaagcggagacagcgacgaagagctcatcagaaca
gtcagactcatcaagcttctctatcaaagcagtaagtagtacatgtaatgcaacctataatagtagcaatagt
agcattagtagtagcaataataatagcaatagttgtgtggtccatagtaatcatagaatataggaaaatatta
agacaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagacagtggcaatgagagtgaag
gagaagtatcagcacttgtggagatgggggtggaaatggggcaccatgctccttgggatattgatgatctgta
gtgctacagaaaaattgtgggtcacagtctattatggggtacctgtgtggaaggaagcaaccaccactctatt
ttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggccacacatgcctgtgtacccaca
gaccccaacccacaagaagtagtattggtaaatgtgacagaaaattttaacatgtggaaaaatgacatggtag
aacagatgcatgaggatataatcagtttatgggatcaaagcctaaagccatgtgtaaaattaaccccactctg
tgttagtttaaagtgcactgatttgaagaatgatactaataccaatagtagtagcgggagaatgataatggag
aaaggagagataaaaaactgctctttcaatatcagcacaagcataagagataaggtgcagaaagaatatgcat
tcttttataaacttgatatagtaccaatagataatacca
gctataggttgataagttgtaacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaattcc
catacattattgtgccccggctggttttgcgattctaaaatgtaataataagacgttcaatggaacaggacca
tgtacaaatgtcagcacagtacaatgtacacatggaatcaggccagtagtatcaactcaactgctgttaaatg
gcagtctagcagaagaagatgtagtaattagatctgccaatttcacagacaatgctaaaaccataatagtaca
gctgaacacatctgtagaaattaattgtacaagacccaacaacaatacaagaaaaagtatccgtatccagagg
ggaccagggagagcatttgttacaataggaaaaataggaaatatgagacaagcacattgtaacattagtagag
caaaatggaatgccactttaaaacagatagctagcaaattaagagaacaatttggaaataataaaacaataat
ctttaagcaatcctcaggaggggacccagaaattgtaacgcacagttttaattgtggaggggaatttttctac
tgtaattcaacacaactgtttaatagtacttggtttaatagtacttggagtactgaagggtcaaataacactg
aaggaagtgacacaatcacactcccatgcagaataaaacaatttataaacatgtggcaggaagtaggaaaagc
aatgtatgcccctcccatcagtggacaaattagatgttcatcaaatattactgggctgctattaacaagagat
ggtggtaataacaacaatgggtccgagatcttcagacctggaggaggcgatatgagggacaattggagaagtg
aattatataaatataaagtagtaaaaattgaaccattaggagtagcacccaccaaggcaaagagaagagtggt
gcag**ACTAGT**gcagtgggaataggagctttgttccttg
ΔCleavage site(**agagaaaaaaga**)→SpeI
ggttcttgggagcagcaggaagcactatgggctgcacgtcaatgacgctgacggtacaggccagacaattatt
gtctgatatagtgcagcagcagaacaatttgctgagggctattgaggcgcaacagcatctgttgcaactcaca
gtctggggcatcaaacagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctgg
ggatttggggttgctctggaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaatc
tctggaacagatttggaataacatgacctggatggagtgggacagagaaattaacaattacacaagcttaata
cactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagataaatggg
caagtttgtggaattggtttaacataacaaattggctgtggtatataaaattattcataatgatagtaggagg
cttggtaggtttaagaatagtttttgctgtactttctatagtgaatagagttaggcagggatattcaccatta
tcgtttcagacccacctcccaatcccgaggggacccgacaggcccgaaggaatagaagaagaaggtggagaga
gagacagagacagatccattcgattagtgaacggatccttagcacttatctgggacgatctgcggagcctgtg
cctcttcagctaccaccgcttgagagacttactcttgattgtaacgaggattgtggaacttctgggacgcagg
gggtgggaagccctcaaatattggtggaatctcctacagtattggagtcaggaactaaagaatagtgctgtta
acttgctcaatgccacagccatagcagtagctgagtaa

FIGURE 43

DNA Sequence of $E^{m}\Delta V_{12}\Delta C\Delta T^{99}$.T.R (Strain pNL4-3) [SEQ ID NO: 20]:

Gaattctgcaacaactgctgtttatccatttcagaattgggtgtcgacatag
EcoRI
Cagaataggcgttactcgacagaggagagcaagaaatggagccagtagatcctagactagagccctggaagca
tccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaaagtgttgctttcattgccaagtttgt
ttcatgacaaaagccttaggcatctcctatggcaggaagaagcggagacagcgacgaagagctcatcagaaca
gtcagactcatcaagcttctctatcaaagcagtaagtagtacatgtaatgcaacctataatagtagcaatagt
agcattagtagtagcaataataatagcaatagttgtgtggtccatagtaatcatagaatataggaaaatatta
agacaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagacagtggcaatgagagtgaag
gagaagtatcagcacttgtggagatgggggtggaaatggggcaccatgctccttgggatattgatgatctgta
gtgctacagaaaaattgtgggtcacagtctattatggggtacctgtgtggaaggaagcaaccaccactctatt
ttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggccacacatgcctgtgtacccaca
gaccccaacccacaagaagtagtattggtaaatgtgacagaaaattttaacatgtggaaaaatgacatggtag
aacagatgcatgaggatataatcagtttatgggatcaaagcctaaagccatgtgtaaaattaaccccactctg
tgtt **ΔV1 and V2 loops**
Agttgtaacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaattcccatacattattgtg
ccccggctggttttgcgattctaaaatgtaataataagacgttcaatggaacaggaccatgtacaaatgtcag
cacagtacaatgtacacatggaatcaggccagtagtatcaactcaactgctgttaaatggcagtctagcagaa
gaagatgtagtaattagatctgccaatttcacagacaatgctaaaaccataatagtacagctgaacacatctg
tagaaattaattgtacaagacccaacaacaatacaagaaaaagtatccgtatccagaggggaccagggagagc
atttgttacaataggaaaaataggaaatatgagacaagcacattgtaacattagtagagcaaaatggaatgcc
actttaaaacagatagctagcaaattaagagaacaatttggaaataataaaacaataatctttaagcaatcct
caggaggggacccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgtaattcaacaca
actgtttaatagtacttggtttaatagtacttggagtactgaagggtcaaataacactgaaggaagtgacaca
atcacactcccatgcagaataaaacaatttataaacatgtggcaggaagtaggaaaagcaatgtatgcccctc
ccatcagtggacaaattagatgttcatcaaatattactgggctgctattaacaagagatggtggtaataacaa
caatgggtccgagatcttcagacctggaggaggcgatatgagggacaattggagaagtgaattatataaatat
aaagtagtaaaaattgaaccattaggagtagcacccaccaaggcaaagagaagagtggtgcag**ACTAGT**gcag
tgggaataggagctttgttccttgggttcttgggagca
ΔCleavage site(**agagaaaaaaga**)→SpeI
gcaggaagcactatgggctgcacgtcaatgacgctgacggtacaggccagacaattattgtctgatatagtgc
agcagcagaacaatttgctgagggctattgaggcgcaacagcatctgttgcaactcacagtctggggcatcaa
acagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctggggatttggggttgc
tctggaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaatctctggaacagattt
ggaataacatgacctggatggagtgggacagagaaattaacaattacacaagcttaatacactccttaattga
agaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagataaatgggcaagtttgtggaat
tggtttaacataacaaattggctgtggtatataaaattattcataatgatagtaggaggcttggtaggtttaa
gaatagtttttgctgtactttctatagtgaatagagttaggcagggatattcaccattatcgtttcagaccca
cctcccaatcccgaggggacccgacaggcccgaaggaatagaagaagaaggtggagagagagacagagacaga
tccattcgattagtgaacggatccttagcacttatctgggacgatctgcggagcctgtgcctcttcagctacc
accgcttgagagacttactcttgattgtaacgaggattgtggaacttctgggacgcaggggggtgggaagccct
caaatattggtggaatctcctacagtattggagtcaggaactaaagaatagtgctgttaacttgctcaatgcc
acagccatagcagtagctgagtaa

FIGURE 44

DNA Sequence of Env^{m}ΔC.T.R.N (Strain BH10) [SEQ ID NO: 21]:

Gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacat
EcoRI
agcagaataggcgttactcgacagaggagagcaagaaatggagccagtagatcctagactagagccctgga
agcatccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaaagtgttgctttcattgccaa
gtttgtttcataacaaaagccttaggcatctcctatggcaggaagaagcggagacagcgacgaagacctcc
tcaaggcagtcagactcatcaagtttctctatcaaagcagtaagtagtacatgtaatgcaacctatacaaa
tagcaatagtagcattagtagtagcaataataatagcaatagttgtgtggtccatagtaatcatagaatat
aggaaaatattaagacaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagacagtgg
caatgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatggggcaccatgctccttggg
atgttgatgatctgtagtgctacagaaaaattgtgggtcacagtctattatggggtacctgtgtggaagga
agcaaccaccactctattttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggcca
cacatgcctgtgtacccacagaccccaacccacaagaagtagtattggtaaatgtgacagaaaatttttaac
atgtggaaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaagcctaaagcc
atgtgtaaaattaaccccactctgtgttagtttaaagtgcactgatttgaagaatgatactaataccaata
gtagtagcgggagaatgataatggagaaaggagagataaaaaactgctctttcaatatcagcacaagcata
agaggtaaggtgcagaaagaatatgcatttttttataaacttgatataataccaatagataatgatactac
cagctatacgttgacaagttgtaacacctcagtcattacacaggcctgtccaaaggtatcctttgagccaa
ttcccatacattattgtgccccggctggttttgcgattctaaaatgtaataataagacgttcaatggaaca
ggaccatgtacaaatgtcagcacagtacaatgtacacatggaattaggccagtagtatcaactcaactgct
gttaaatggcagtctggcagaagaagaggtagtaattagatctgccaatttcacagacaatgctaaaacca
taatagtacagctgaaccaatctgtagaaattaattgtacaagacccaacaacaatacaagaaaaagtatc
cgtatccagagaggaccagggagagcatttgttacaataggaaaaataggaaatatgagacaagcacattg
taacattagtagagcaaaatggaataacactttaaaacagatagatagcaaattaagagaacaatttggaa
ataataaaacaataatctttaagcagtcctcaggaggggacccagaaattgtaacgcacagttttaattgt
ggaggggaatttttctactgtaattcaacacaactgtttaatagtacttggtttaatagtacttggagtac
taaagggtcaaataacactgaaggaagtgacacaatcaccctcccatgcagaataaaacaaattataaaca
tgtggcaggaagtaggaaaagcaatgtatgcccctcccatcagtggacaaattagatgttcatcaaatatt
acagggctgctattaacaagagatggtggtaatagcaacaatgagtccgagatcttcagacctggaggagg
agatatgagggacaattggagaagtgaattatataaatataaagtagtaaaaattgaaccattaggagtag
cacccaccaaggcaaagagaagagtggtgcagACTAGTgcagtgggaataggagctttgttccttgggttc
t
ΔCleavage site (**agagaaaaaaga**)→SpeI
tgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagacaattattgtct
ggtatagtgcagcagcagaacaatttgctgagggctattgaggcgcaacagcatctgttgcaactcacagt
ctggggcatcaagcagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctgg
ggatttggggttgctctggaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaa
tctctggaacagatttggaataacatgacctggatggagtgggacagagaaattaacaattacacaagctt
aatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagata
aatgggcaagtttgtggaattggtttaacataacaaattggctgtggtatataaaattattcataatgata
gtaggaggcttggtaggtttaagaatagttttgctgtactttctgtagtgaatagagttaggcagggata
ttcaccattatcgtttcagacccacctcccaatcccgaggggacccgacaggcccgaaggaatagaagaag
aaggtggagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctgggacgat
ctgcggagcctgtgcctcttcagctaccaccgcttgagagacttactcttgattgtaacgaggattgtgga
acttctgggacgcaggggtgggaagccctcaaatattggtggaatctcctacagtattggagtcaggagc
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gaagtagtacaaggagcttatagagctattcgccacatacctagaagaataagacagggcttggaaaggat
tttgctataagatgggtggcaagtggtcaaaaagtagtgtggttggatggcctgctgtaagggaaagaatg
agacgagctgagccagcagcagatggggtgggagcagcatctcgagacctagaaaaacatggagcaatcac
aagtagcaacacagcagctaacaatgctgattgtgcctggctagaagcacaagaggaggaggaggtgggtt
ttccagtcacacctcaggtacctttaagaccaatgacttacaaggcagctgtagatcttagccacttttta
aaagaaaaggggggactggaagggctaattcactcccaacgaagacaagatatccttgatctgtggatcta
ccacacacaaggctacttccctgattag

FIGURE 45

DNA Sequence of $E^m\Delta C.N$ (Strain BH10) [SEQ ID NO: 22]:

Gaattcgccaccatgggagtgaaggagaaatatcagcacttgtggagatgg
EcoRI Kozak NcoI
gggtggagatggggcaccatgctccttgggatgttgatgatctgtagtgctacagaaaaattgtgggtcac
agtctattatggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcagatgctaaagcat
atgatacagaggtacataatgtttgggccacacatgcctgtgtacccacagaccccaacccacaagaagta
gtattggtaaatgtgacagaaaattttaacatgtggaaaaatgacatggtagaacagatgcatgaggatat
aatcagtttatgggatcaaagcctaaagccatgtgtaaaattaaccccactctgtgttagtttaaagtgca
ctgatttgaagaatgatactaataccaatagtagtagcgggagaatgataatggagaaaggagagataaaa
aactgctctttcaatatcagcacaagcataagaggtaaggtgcagaaagaatatgcatttttttataaact
tgatataataccaatagataatgatactaccagctatacgttgacaagttgtaacacctcagtcattacac
aggcctgtccaaaggtatcctttgagccaattcccatacattattgtgccccggctggttttgcgattcta
aaatgtaataataagacgttcaatggaacaggaccatgtacaaatgtcagcacagtacaatgtacacatgg
aattaggccagtagtatcaactcaactgctgttaaatggcagtctggcagaagaagaggtagtaattagat
ctgccaatttcacagacaatgctaaaaccataatagtacagctgaaccaatctgtagaaattaattgtaca
agacccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttgttacaatagg
aaaaatagga aatatgagacaagcacattgtaacattagtagagcaaaatggaataacactttaaaacaga
tagatagcaaattaagagaacaatttggaaataataaaacaataatctttaagcagtcctcaggaggggac
ccagaaattgtaacgcacagttttattgtggaggggaatttttctactgtaattcaacacaactgtttaa
tagtacttggtttaatagtacttggagtactaaagggtcaaataacactgaaggaagtgacacaatcaccc
tcccatgcagaataaaacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgcccctcccatc
agtggacaaattagatgttcatcaaatattacagggctgctattaacaagagatggtggtaatagcaacaa
tgagtccgagatcttcagacctggaggaggagatatgagggacaattggagaagtgaattatataaatata
aagtagtaaaaattgaaccattaggagtagcacccaccaaggcaaagagaagagtggtgcag**ACTAGT**gca
gtgggaataggagctttgttccttgggttcttgggagc

ΔCleavage site(**agagaaaaaaga**)→SpeI

agcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagacaattattgtctggtatag
tgcagcagcagaacaatttgctgagggctattgaggcgcaacagcatctgttgcaactcacagtctggggc
atcaagcagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctggggatttg
gggttgctctggaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaatctctgg
aacagatttggaataacatgacctggatggagtgggacagagaaattaacaattacacaagcttaatacac
tccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagataaatgggc
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gcttggtaggtttaagaatagtttttgctgtactttctgtagtgaatagagttaggcagggatattcacca
ttatcgtttcagacccacctcccaatcccgaggggacccgacaggcccgaaggaatagaagaagaaggtgg
agagagagacagagacagatccattcgattagtgaacggatccttagcacttatctgggacgatctgcgga
gcctgtgcctcttcagctaccaccgcttgagagacttactcttgattgtaacgaggattgtggaacttctg
ggacgcaggggtgggaagccctcaaatattggtggaatctcctacagtattggagtcaggagctaaagaa
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taagatgggtggcaagtggtcaaaaagtagtgtggttggatggcctgctgtaagggaaagaatgagacgag
ctgagccagcagcagatggggtgggagcagcatctcgagacctagaaaaacatggagcaatcacaagtagc
aacacagcagctaacaatgctgattgtgcctggctagaagcacaagaggaggaggaggtgggttttccagt
cacacctcaggtacctttaagaccaatgacttacaaggcagctgtagatcttagccacttttaaaagaaa
agggggactggaagggctaattcactcccaacgaagacaagatatccttgatctgtggatctaccacaca
caaggctacttccctgattag

FIGURE 46

DNA Sequence of $E^{m}\Delta C\Delta T^{300}$.T (BH10) [SEQ ID NO: 23]:

Gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacat
EcoRI
Agcagaataggcgttactcgacagaggagagcaagaa**atg**gagccagtaga
Tat 1
tcctagactagagccctggaagcatccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaa
agtgttgctttcattgccaagtttgtttcataacaaaagccttaggcatctcctatggcaggaagaagcgg
agacagcgacgaagacctcctcaaggcagtcagactcatcaagtttctctatcaaagcagtaagtagtaca
tgtaatgcaacctatacaaatagcaatagtagcattagtagtagcaataataatagcaatagttgtgtggt
ccatagtaatcatagaatataggaaaatattaagacaaagaaaaatagacaggttaattgatagactaata
gaaagagcagaagacagtggca**atg**agagtgaaggagaaatatcagcacttgtggagatgggggtggagat
ggggcaccatgctccttgggatgttgatgatctgtagtgctacagaaaaattgtgggtcacagtctattat
ggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcagatgctaaagcatatgatacaga
ggtacataatgtttgggccacacatgcctgtgtacccacagaccccaacccacaagaagtagtattggtaa
atgtgacagaaaatttttaacatgtggaaaaatgacatggtagaacagatgcatgaggatataatcagttta
tgggatcaaagcctaaagccatgtgtaaaattaaccccactctgtgttagtttaaagtgcactgatttgaa
gaatgatactaataccaatagtagtagcgggagaatgataatggagaaaggagagataaaaaactgctctt
tcaatatcagcacaagcataagaggtaaggtgcagaaagaatatgcatttttttataaacttgatataata
ccaatagataatgatactaccagctatacgttgacaagttgtaacacctcagtcattacacaggcctgtcc
aaaggtatcctttgagccaattcccatacattattgtgccccggctggttttgcgattctaaaatgtaata
ataagacgttcaatggaacaggaccatgtacaaatgtcagcacagtacaatgtacacatggaattaggcca
gtagtatcaactcaactgctgttaaatggcagtctggcagaagaagaggtagtaattagatctgccaattt
cacagacaatgctaaaaccataatagtacagctgaaccaatctgtagaaattaattgtacaagacccaaca
acaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttgttacaatagggaaaaatagga
aatatgagacaagcacattgtaacattagtagagcaaaatggaataacactttaaaacagatagatagcaa
attaagagaacaatttggaaataataaaacaataatctttaagcagtcctcaggaggggacccagaaattg
taacgcacagttttaattgtggaggggaatttttctactgtaattcaacacaactgtttaatagtacttgg
tttaatagtacttggagtactaaagggtcaaataacactgaaggaagtgacacaatcaccctcccatgcag
aataaaacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgcccctcccatcagtggacaaa
ttagatgttcatcaaatattacagggctgctattaacaagagatggtggtaatagcaacaatgagtccgag
atcttcagacctggaggaggagatatgagggacaattggagaagtgaattatataaatataaagtagtaaa
aattgaaccattaggagtagcacccaccaaggcaaagagaagagtggtgcag**ACTAGT**gcagtgggaatag
gagctttgttccttgggttc
ΔCleavage site(**agagaaaaaaga**)→SpeI
ttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagacaattattgtc
tggtatagtgcagcagcagaacaatttgctgagggctattgaggcgcaacagcatctgttgcaactcacag
tctggggcatcaagcagctccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctcctg
gggatttggggttgctctggaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataa
atctctggaacagatttggaataacatgacctggatggagtgggacagagaaattaacaattacacaagct
taatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattattggaattagat
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agtaggaggcttggtaggtttaagaatagtttttgctgtactttctgtagtgaatagagttaggcagggat
attcaccattatcgtttcagacccacctcccaatcccgaggggacccgacaggcccgaaggaatagaagaa
gaaggtggagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctggtaa

Figure 47

DNA Sequence of E^m/E^m (BH10) [SEQ ID NO: 24]:

Gaattcgccaccatgggagtgaaggagaaatatcagcacttgtggagatgg
EcoRI Kozak NcoI
gggtggagatggggcaccatgctccttgggatgttgatgatctgtagtgctacagaaaaattgtgggtcac
agtctattatggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcagatgctaaagcat
atgatacagaggtacataatgtttgggccacacatgcctgtgtacccacagaccccaacccacaagaagta
gtattggtaaatgtgacagaaaatttttaacatgtggaaaaatgacatggtagaacagatgcatgaggatat
aatcagtttatgggatcaaagcctaaagccatgtgtaaaattaaccccactctgtgttagtttaaagtgca
ctgatttgaagaatgatactaataccaatagtagtagcgggagaatgataatggagaaaggagagataaaa
aactgctctttcaatatcagcacaagcataagaggtaaggtgcagaaagaatatgcatttttttataaact
tgatataataccaatagataatgatactaccagctatacgttgacaagttgtaacacctcagtcattacac
aggcctgtccaaaggtatcctttgagccaattcccatacattattgtgccccggctggttttgcgattcta
aaatgtaataataagacgttcaatggaacaggaccatgtacaaatgtcagcacagtacaatgtacacatgg
aattaggccagtagtatcaactcaactgctgttaaatggcagtctggcagaagaagaggtagtaattagat
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agacccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttgttacaatagg
aaaaataggaaatatgagacaagcacattgtaacattagtagagcaaaatggaataacactttaaaacaga
tagatagcaaattaagagaacaatttggaaataataaaacaataatctttaagcagtcctcaggaggggac
ccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgtaattcaacacaactgtttaa
tagtacttggtttaatagtacttggagtactaaagggtcaaataacactgaaggaagtgacacaatcaccc
tcccatgcagaataaaacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgcccctcccatc
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aagtagtaaaaattgaaccattaggagtagcacccaccaaggcaaagagaagagtggtgcagagagaaaaa
agagcagtgggaataggagctttgttccttgggttcttgggagcagcaggaagcactatgggcgcagcgtc
aatgacgctgacggtacaggccagacaattattgtctggtatagtgcagcagcagaacaatttgctgaggg
ctattgaggcgcaacagcatctgttgcaactcacagtctggggcatcaagcagctccaggcaagaatcctg
gctgtggaaagatacctaaaggatcaacagctcctggggatttggggttgctctggaaaactcatttgcac
cactgctgtgccttggaatgctagttggagtaataaatctctggaacagatttggaataacatgacctgga
tggagtgggacagagaaattaacaattacacaagcttaatacactccttaattgaagaatcgcaaaaccag
caagaaaagaatgaacaagaattattggaattagataaatgggcaagtttgtggaattggtttaacataac
aaattggctgtggtatataaaattattcataatgatagtaggaggcttggtaggtttaagaatagtttttg
ctgtactttctgtagtgaatagagttaggcagggatattcaccattatcgtttcagacccacctcccaatc
ccgaggggacccgacaggcccgaaggaatagaagaagaaggtggagagagagacagagacagatccattcg
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tgagagacttactcttgattgtaacgaggattgtggaacttctgggacgcaggggtgggaagccctcaaa
tattggtggaatctcctacagtattggagtcaggagctaaagaatagtgctgttagcttgctcaatgccac
agctatagcagtagctgaggggacagatagggttatagaagtagtacaaggagcttatagagctattcgcc
acatacctagaagaataagacagggcttggaaaggattttgctataa

FIGURE 48

Sequences of V3 loop Multi-clade HIV-1 Clones:

Clade	ACC#	HIV-1 Strain	From(nt)	To(nt)
B	M15654	BH10	885	992
A	U09127	192UG037WHO.01083hED	888	992
C	U09126	192BR025WHO.01093hED	876	980
D	U43386	192UG024.2	888	989
E	U08458	193TH976.17	894	998
F	U27401	193BR020.17	888	992
G	U30312	192RU131.9	885	989

Tgtacaagacccaacaacaatacaagaaaaagtatccgtatccagagagga
ccagggagagcatttgttacaataggaaaaataggaaatatgagacaagca
cattgt **Clade B [SEQ ID NO: 25]**

Tgtaccagacctaacaacaatacaagaaaaagtgtacgtataggaccagga
caaacattctatgcaacaggtgatataataggggatataagacaagcacat
tgt **Clade A [SEQ ID NO: 26]**

Tgtacgagacccaacaataatacaagaaaaagtataaggataggaccagga
caagcattctatgcaacaggagaaataataggagatataagacaagcacat
tgt **Clade C [SEQ ID NO: 27]**

Tgcacaaggccctacaacaatataagacaaaggacccccataggactaggg
caagcactctatacaacaagaagaatagaagatataagaagagcacattgt
Clade D [SEQ ID NO: 28]

Tgtaccagaccctccaccaatacaagaacaagtatacgtataggaccagga
caagtattctatagaacaggagacataacaggagatataagaaaagcatat
tgt **Clade E [SEQ ID NO: 29]**

Tgtacaagacccaacaacaatacaagaaaaagaatatctttaggaccagga
cgagtattttatacagcaggagaaataataggagacatcagaaaggcacat
tgt **Clade F [SEQ ID NO: 30]**

Tgtaccagacctaataacaatacaagaaaaagtataacttttgcaccagga
caagcgctctatgcaacaggtgaaataataggagatataagacaagcacat
tgt **Clade G [SEQ ID NO: 31]**

FIGURE 49A

DNA sequence of modified Env including multi-clade V3 loops [SEQ ID NO: 32]:

Atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatggggcaccatgctccttgggat
gttgatgatctgtagtgctacagaaaaattgtgggtcacagtctattatggggtacctgtgtggaaggaag
caaccaccactctattttgtgcatcagatgctaaagcatatgatacagaggtacataatgtttgggccaca
catgcctgtgtacccacagaccccaacccacaagaagtagtattggtaaatgtgacagaaaattttaacat
gtggaaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaagcctaaagccat
gtgtaaaattaaccccactctgtgtt**ggagctggt**agttgtaacacctcagt
V1, V2 deletion, GAG insertion
Cattacacaggcctgtccaaaggtatcctttgagccaattcccatacattattgtgccccggctggttttg
cgattctaaaatgtaataataagacgttcaatggaacaggaccatgtacaaatgtcagcacagtacaatgt
acacatggaattaggccagtagtatcaactcaactgctgttaaatggcagtctggcagaagaagaggtagt
aattagatctgccaatttcacagacaatgctaaaaccataatagtacagctgaaccaatctgtagaaatta
at**tgt**acaagacccaacaacaa
Start of Clade B
Tacaagaaaaagtatccgtatccagagaggaccagggagagcatttgttacaataggaaaaataggaaata
tgagacaagcacattgtctcggg**tgt**accag
Insert a AvaI site Clade A
Acctaacaacaatacaagaaaaagtgtacgtataggaccaggacaaacattctatgcaacaggtgatataa
taggggatataagacaagcacattgt**tgt**ac
Clade C
Gagacccaacaataatacaagaaaaagtataaggataggaccaggacaagcattctatgcaacaggagaaa
taataggagatataagacaagcacattgt**tg**
Clade D
Cacaaggccctacaacaatataagacaaaggacccccataggactagggcaagcactctatacaacaagaa
gaatagaagatataagaagagcacattgt**tg**
Clade E
Taccagaccctccaccaatacaagaacaagtatacgtataggaccaggacaagtattctatagaacaggag
acataacaggagatataagaaaagcatattgtggatcc**tgt**acaagacccaacaacaatacaagaaaaaga
atatctttagg
BamHI clade F
Accaggacgagtattttatacagcaggagaaataataggagacatcagaaaggcacattgt**tgt**accagac
ctaataacaatacaagaaaaagtataacttt
Clade G
Tgcaccaggacaagcgctctatgcaacaggtgaaataataggagatataagacaagcacattgtctcggga
acattagtagagcaaaatggaataacacttt
Insert a AvaI
Aaaacagatagatagcaaattaagagaacaatttggaaataataaaacaataatctttaagcagtcctcag
gaggggacccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgtaattcaacacaa
ctgtttaatagtacttggtttaatagtacttggagtactaaagggtcaaataacactgaaggaagtgacac
aatcaccctcccatgcagaataaaacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgccc
ctcccatcagtggacaaattagatgttcatcaaatattacagggctgctattaacaagagatggtggtaat
agcaacaatgagtccgagatcttcagacctggaggaggagatatgagggacaattggagaagtgaattata
taaatataaagtagtaaaaattgaaccattaggagtagcacccaccaaggcaaagagaagagtggtgcaga
ctagtgcagtggg
Cleavage site mutation (SpeI)
Aataggagctttgttccttgggttcttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctga
cggtacaggccagacaattattgtctggtatagtgcagcagcagaacaatttgctgagggctattgaggcg
caacagcatctgttgcaactcacagtctggggcatcaagcagctccaggcaagaatcctggctgtggaaag
atacctaaaggatcaacagctcctggggatttggggttgctctggaaaactcatttgcaccactgctgtgc
cttggaatgctagttggagtaataaatctctggaacagatttggaataacatgacctggatggagtgggac
agagaaattaacaattacacaagcttaatacactccttaattgaagaatcgcaaaaccagcaagaaaagaa
tgaacaagaattattggaattagataaatgggcaagtttgtggaattggtttaacataacaaattggctgt
ggtatataaaa**tcgtggctgctgctgctcctgctctccctctccctcctccaggccacggatttcatgtcc**
ctgtga GPI anchor

FIGURE 49B

Amino acid sequence of modified Env including multi-clade V3 loops [SEQ ID NO: 33]:

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	L	M	I	C	S	A	T	E	K	L	W	V
T	V	Y	Y	G	V	P	V	W	K	E	A	T	T	T	L	F	C
A	S	D	A	K	A	Y	D	T	E	V	H	N	V	W	A	T	H
A	C	V	P	T	D	P	N	P	Q	E	V	V	L	V	N	V	T
E	N	F	N	M	W	K	N	D	M	V	E	Q	M	H	E	D	I
I	S	L	W	D	Q	S	L	K	P	C	V	K	L	T	P	L	C
V	G	A	G	S	C	N	T	S	V	I	T	Q	A	C	P	K	V
S	F	E	P	I	P	I	H	Y	C	A	P	A	G	F	A	I	L
K	C	N	N	K	T	F	N	G	T	G	P	C	T	N	V	S	T
V	Q	C	T	H	G	I	R	P	V	V	S	T	Q	L	L	L	N
G	S	L	A	E	E	E	V	V	I	R	S	A	N	F	T	D	N
A	K	T	I	I	V	Q	L	N	Q	S	V	E	I	N	C	T	R
P	N	N	N	T	R	K	S	I	R	I	Q	R	G	P	G	R	A
F	V	T	I	G	K	I	G	N	M	R	Q	A	H	C	L	G	C
T	R	P	N	N	N	T	R	K	S	V	R	I	G	P	G	Q	T
F	Y	A	T	G	D	I	I	G	D	I	R	Q	A	H	C	C	T
R	P	N	N	N	T	R	K	S	I	R	I	G	P	G	Q	A	F
Y	A	T	G	E	I	I	G	D	I	R	Q	A	H	C	C	T	R
P	Y	N	N	I	R	Q	R	T	P	I	G	L	G	Q	A	L	Y
T	T	R	R	I	E	D	I	R	R	A	H	C	C	T	R	P	S
T	N	T	R	T	S	I	R	I	G	P	G	Q	V	F	Y	R	T
G	D	I	T	G	D	I	R	K	A	Y	C	G	S	C	T	R	P
N	N	N	T	R	K	R	I	S	L	G	P	G	R	V	F	Y	T
A	G	E	I	I	G	D	I	R	K	A	H	C	C	T	R	P	N
N	N	T	R	K	S	I	T	F	A	P	G	Q	A	L	Y	A	T
G	E	I	I	G	D	I	R	Q	A	H	C	L	G	N	I	S	R
A	K	W	N	N	T	L	K	Q	I	D	S	K	L	R	E	Q	F
G	N	N	K	T	I	I	F	K	Q	S	S	G	G	D	P	E	I
V	T	H	S	F	N	C	G	G	E	F	F	Y	C	N	S	T	Q
L	F	N	S	T	W	F	N	S	T	W	S	T	K	G	S	N	N
T	E	G	S	D	T	I	T	L	P	C	R	I	K	Q	I	I	N
M	W	Q	E	V	G	K	A	M	Y	A	P	P	I	S	G	Q	I
R	C	S	S	N	I	T	G	L	L	L	T	R	D	G	G	N	S
N	N	E	S	E	I	F	R	P	G	G	G	D	M	R	D	N	W
R	S	E	L	Y	K	Y	K	V	V	K	I	E	P	L	G	V	A
P	T	K	A	K	R	R	V	V	Q	T	S	A	V	G	I	G	A
L	F	L	G	F	L	G	A	A	G	S	T	M	G	A	A	S	M
T	L	T	V	Q	A	R	Q	L	L	S	G	I	V	Q	Q	Q	N
N	L	L	R	A	I	E	A	Q	Q	H	L	L	Q	L	T	V	W
G	I	K	Q	L	Q	A	R	I	L	A	V	E	R	Y	L	K	D
Q	Q	L	L	G	I	W	G	C	S	G	K	L	I	C	T	T	A
V	P	W	N	A	S	W	S	N	K	S	L	E	Q	I	W	N	N
M	T	W	M	E	W	D	R	E	I	N	N	Y	T	S	L	I	H
S	L	I	E	E	S	Q	N	Q	Q	E	K	N	E	Q	E	L	L
E	L	D	K	W	A	S	L	W	N	W	F	N	I	T	N	W	L
W	Y	I	K	S	W	L	L	L	L	L	L	S	L	S	L	L	Q
A	T	D	F	M	S	L	*										

FIGURE 50A

1. DNA sequence of p17/24 in natural form [SEQ ID NO: 34]:

atgggtgcgagagcgtcagtattaagcgggggagaattagatcgatgggaaaaaattcggttaaggccagg
gggaaagaaaaaatataaattaaaacatatagtatgggcaagcagggagctagaacgattcgcagttaatc
ctggcctgttagaaacatcagaaggctgtagacaaatactgggacagctacaaccatcccttcagacagga
tcagaagaacttagatcattatataatacagtagcaaccctctattgtgtgcatcaaaggatagagataaa
agacaccaaggaagctttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcag
cagctgacacaggacacagcagtcaggtcagccaaaattaccctatagtgcagaacatccaggggcaaatg
gtacatcaggccatatcacctagaactttaaatgcatgggtaaaagtagtagaagagaaggctttcagccc
agaagtaatacccatgttttcagcattatcagaaggagccaccccacaagatttaaacaccatgctaaaca
cagtgggggggacatcaagcagccatgcaaatgttaaaagagaccatcaatgaggaagctgcagaatgggat
agagtacatccagtgcatgcagggcctattgcaccaggccagatgagagaaccaaggggaagtgacatagc
aggaactactagtaccttcaggaacaaataggatggatgacaaataatccacctatcccagtaggagaaa
tttataaaagatggataatcctgggattaaataaaatagtaagaatgtatagccctaccagcattctggac
ataagacaaggaccaaaagaacctttagagactatgtagaccggttctataaaactctaagagccgagca
agcttcacaggaggtaaaaaattggatgacagaaaccttgttggtccaaaatgcgaacccagattgtaaga
ctattttaaaagcattgggaccagcggctacactagaagaaatgatgacagcatgtcagggagtaggagga
cccggccataaggcaagagttttgtaa

2. DNA sequence of p17/24 in secreted form [SEQ ID NO: 35]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg
gp120 signal peptide
ggcaccatgctccttgggatgttgatgatctgtagtgctggtgcgagagcg
p17/p24
tcagtattaagcgggggagaattagatcgatgggaaaaaattcggttaaggccagggggaaagaaaaaata
taaattaaaacatatagtatgggcaagcagggagctagaacgattcgcagttaatcctggcctgttagaaa
catcagaaggctgtagacaaatactgggacagctacaaccatcccttcagacaggatcagaagaacttaga
tcattatataatacagtagcaaccctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagc
tttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacaggac
acagcagtcaggtcagccaaaattaccctatagtgcagaacatccaggggcaaatggtacatcaggccata
tcacctagaactttaaatgcatgggtaaaagtagtagaagagaaggctttcagcccagaagtaatacccat
gttttcagcattatcagaaggagccaccccacaagatttaaacaccatgctaaaacacagtgggggacatc
aagcagccatgcaaatgttaaaagagaccatcaatgaggaagctgcagaatgggatagagtacatccagtg
catgcagggcctattgcaccaggccagatgagagaaccaaggggaagtgacatagcaggaactactagtac
ccttcaggaacaaataggatggatgacaaataatccacctatcccagtaggagaaatttataaaagatgga
taatcctgggattaaataaaatagtaagaatgtatagccctaccagcattctggacataagacaaggacca
aaagaacctttagagactatgtagaccggttctataaaactctaagagccgagcaagcttcacaggaggt
aaaaaattggatgacagaaaccttgttggtccaaaatgcgaacccagattgtaagactattttaaaagcat
tgggaccagcggctacactagaagaaatgatgacagcatgtcagggagtaggaggacccggccataaggca
agagttttgtaa

FIGURE 50A -continued

1. DNA sequence of p17/24 in membrane form [SEQ ID NO: 36]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg
gp120 signal peptide
Ggcaccatgctccttgggatgttgatgatctgtagtgctggtgcgagagcg
P17/p24
tcagtattaagcgggggagaattagatcgatgggaaaaaattcggttaaggccagggggaaagaaaaaata
taaattaaaacatatagtatgggcaagcagggagctagaacgattcgcagttaatcctggcctgttagaaa
catcagaaggctgtagacaaatactgggacagctacaaccatcccttcagacaggatcagaagaacttaga
tcattatataatacagtagcaaccctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagc
tttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacaggac
acagcagtcaggtcagccaaaattaccctatagtgcagaacatccaggggcaaatggtacatcaggccata
tcacctagaactttaaatgcatgggtaaaagtagtagaagagaaggctttcagcccagaagtaatacccat
gttttcagcattatcagaaggagccaccccacaagatttaaacaccatgctaaacacagtgggggacatc
aagcagccatgcaaatgttaaaagagaccatcaatgaggaagctgcagaatgggatagagtacatccagtg
catgcagggcctattgcaccaggccagatgagagaaccaaggggaagtgacatagcaggaactactagtac
ccttcaggaacaaataggatggatgacaaataatccacctatcccagtaggagaaatttataaaagatgga
taatcctgggattaaataaaatagtaagaatgtatagccctaccagcattctggacataagacaaggacca
aaagaacctttagagactatgtagaccggttctataaaactctaagagccgagcaagcttcacaggaggt
aaaaaattggatgacagaaaccttgttggtccaaaatgcgaacccagattgtaagactattttaaaagcat
tgggaccagcggctacactagaagaaatgatgacagcatgtcagggagtaggaggacccggccataaggca
agagttttg
ttattcataatgatagtaggaggcttggtaggtttaagaatagtttttgctgtactttctgtagtgaatag
agttaggcagggatattcaccattatcgtttcagacccacctcccaatcccgaggggataa
gp41 transmembrane domain

FIGURE 50B

1. Amino acid sequence of p17/24 in natural form [SEQ ID NO: 37]:

```
M G A R A S V L S G G E L D R W E K
I R L R P G G K K K Y K L K H I V W
A S R E L E R F A V N P G L L E T S
E G C R Q I L G Q L Q P S L Q T G S
E E L R S L Y N T V A T L Y C V H Q
R I E I K D T K E A L D K I E E E Q
N K S K K K A Q Q A A A D T G H S S
Q V S Q N Y P I V Q N I Q G Q M V H
Q A I S P R T L N A W V K V V E E K
A F S P E V I P M F S A L S E G A T
P Q D L N T M L N T V G G H Q A A M
Q M L K E T I N E E A A E W D R V H
P V H A G P I A P G Q M R E P R G S
D I A G T T S T L Q E Q I G W M T N
N P P I P V G E I Y K R W I I L G L
N K I V R M Y S P T S I L D I R Q G
P K E P F R D Y V D R F Y K T L R A
E Q A S Q E V K N W M T E T L L V Q
N A N P D C K T I L K A L G P A A T
L E E M M T A C Q G V G G P G H K A
R V L *
```

2. Amino acid sequence of p17/24 in secreted form [SEQ ID NO: 38]:

```
M R V K E K Y Q H L W R W G W R W G
T M L L G M L M I C S A G A R A S V
L S G G E L D R W E K I R L R P G G
K K K Y K L K H I V W A S R E L E R
F A V N P G L L E T S E G C R Q I L
G Q L Q P S L Q T G S E E L R S L Y
N T V A T L Y C V H Q R I E I K D T
K E A L D K I E E E Q N K S K K K A
Q Q A A A D T G H S S Q V S Q N Y P
Q Q A A A D T G H S S Q V S Q N Y P
Q Q A A A D T G H S S Q V S Q N Y P
I V Q N I Q G Q M V H Q A I S P R T
L N A W V K V V E E K A F S P E V I
P M F S A L S E G A T P Q D L N T M
L N T V G G H Q A A M Q M L K E T I
N E E A A E W D R V H P V H A G P I
A P G Q M R E P R G S D I A G T T S
T L Q E Q I G W M T N N P P I P V G
E I Y K R W I I L G L N K I V R M Y
S P T S I L D I R Q G P K E P F R D
Y V D R F Y K T L R A E Q A S Q E V
T I L K A L G P A A T L E E M M T A
C Q G V G G P G H K A R V L *
```

FIGURE 50B-continued

1. Amino acid sequence of p17/24 in membrane bound form [SEQ ID NO: 39]:

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G	
T	M	L	L	G	M	L	M	I	C	S	A	G	A	R	A	S	V	
L	S	G	G	E	L	D	R	W	E	K	I	R	L	R	P	G	G	
L	S	G	G	E	L	D	R	W	E	K	I	R	L	R	P	G	G	
K	K	K	Y	K	L	K	H	I	V	W	A	S	R	E	L	E	R	
F	A	V	N	P	G	L	L	E	T	S	E	G	C	R	Q	I	L	
G	Q	L	Q	P	S	L	Q	T	G	S	E	E	L	R	S	L	Y	
N	T	V	A	T	L	Y	C	V	H	Q	R	I	E	I	K	D	T	
K	E	A	L	D	K	I	E	E	E	Q	N	K	S	K	K	K	A	
Q	Q	A	A	A	D	T	G	H	S	S	Q	V	S	Q	N	Y	P	
I	V	Q	N	I	Q	G	Q	M	V	H	Q	A	I	S	P	R	T	
L	N	A	W	V	K	V	V	E	E	K	A	F	S	P	E	V	I	
P	M	F	S	A	L	S	E	G	A	T	P	Q	D	L	N	T	M	
L	N	T	V	G	G	H	Q	A	A	M	Q	M	L	K	E	T	I	
N	E	E	A	A	E	W	D	R	V	H	P	V	H	A	G	P	I	
A	P	G	Q	M	R	E	P	R	G	S	D	I	A	G	T	T	S	
T	L	Q	E	Q	I	G	W	M	T	N	N	P	P	I	P	V	G	
E	I	Y	K	R	W	I	I	L	G	L	N	K	I	V	R	M	Y	
S	P	T	S	I	L	D	I	R	Q	G	P	K	E	P	F	R	D	
Y	V	D	R	F	Y	K	T	L	R	A	E	Q	A	S	Q	E	V	
K	N	W	M	T	E	T	L	L	V	Q	N	A	N	P	D	C	K	
T	I	L	K	A	L	G	P	A	A	T	L	E	E	M	M	T	A	
C	Q	G	V	G	G	P	G	H	K	A	R	V	L	L	F	I	M	
I	V	G	G	L	V	G	L	R	I	V	F	A	V	L	S	V	V	
N	R	V	R	Q	G	Y	S	P	L	S	F	Q	T	H	L	P	I	
P	R	G	*															

FIGURE 51A

1. DNA sequence of p17 in natural form [SEQ ID NO: 40]:

atgggtgcgagagcgtcagtattaagcgggggagaattagatcgatgggaaaaaattcg
gttaaggccaggggaaagaaaaatataaattaaaacatatagtatgggcaagcaggg
agctagaacgattcgcagttaatcctggcctgttagaaacatcagaaggctgtagacaa
atactgggacagctacaaccatcccttcagacaggatcagaagaacttagatcattata
taatacagtagcaaccctctattgtgtgcatcaaaggatagagataaaagacaccaagg
aagctttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagca
gcagctgacacaggacacagcagtcaggtcagccaaaattactaa

2. DNA sequence of p17 in secreted form [SEQ ID NO: 41]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg
gp120 signal peptide
ggcaccatgctccttgggatgttgatgatctgtagtgct**ggt**gcgagagcg
p17
tcagtattaagcgggggagaattagatcgatgggaaaaaattcggttaaggccagggggg
aaagaaaaaatataaattaaaacatatagtatgggcaagcagggagctagaacgattcg
cagttaatcctggcctgttagaaacatcagaaggctgtagacaaatactgggacagcta
caaccatcccttcagacaggatcagaagaacttagatcattatataatacagtagcaac
cctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagctttagacaaga
tagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacagga
cacagcagtcaggtcagccaaaattactaa

3. DNA sequence of p17 in membrane bound form [SEQ ID NO: 42]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg
gp120 signal peptide
ggcaccatgctccttgggatgttgatgatctgtagtgct**ggt**gcgagagcg
p17
tcagtattaagcgggggagaattagatcgatgggaaaaaattcggttaaggccagggggg
aaagaaaaaatataaattaaaacatatagtatgggcaagcagggagctagaacgattcg
cagttaatcctggcctgttagaaacatcagaaggctgtagacaaatactgggacagcta
caaccatcccttcagacaggatcagaagaacttagatcattatataatacagtagcaac
cctctattgtgtgcatcaaaggatagagataaaagacaccaaggaagctttagacaaga
tagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacagga
cacagcagtcaggtcagccaaaattac
ttattcataatgatagtaggaggcttggtaggtttaagaatagttttgctgtactttc
tgtagtgaatagagttaggcagggatattcaccattatcgtttcagacccacctcccaa
tcccgaggggg**taa**
gp41 transmembrane domain

FIGURE 51B

1. Amino acid sequence of p17 in natural form [SEQ ID NO: 43]:

M	G	A	R	A	S	V	L	S	G	G	E	L	D	R	W	E	K
I	R	L	R	P	G	G	K	K	K	Y	K	L	K	H	I	V	W
A	S	R	E	L	E	R	F	A	V	N	P	G	L	L	E	T	S
E	G	C	R	Q	I	L	G	Q	L	Q	P	S	L	Q	T	G	S
E	E	L	R	S	L	Y	N	T	V	A	T	L	Y	C	V	H	Q
R	I	E	I	K	D	T	K	E	A	L	D	K	I	E	E	E	Q
N	K	S	K	K	K	A	Q	Q	A	A	A	D	T	G	H	S	S
Q	V	S	Q	N	Y	*											

2. Amino acid sequence of p17 in secreted form [SEQ ID NO: 44]:

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	L	M	I	C	S	A	G	A	R	A	S	V
L	S	G	G	E	L	D	R	W	E	K	I	R	L	R	P	G	G
K	K	K	Y	K	L	K	H	I	V	W	A	S	R	E	L	E	R
F	A	V	N	P	G	L	L	E	T	S	E	G	C	R	Q	I	L
G	Q	L	Q	P	S	L	Q	T	G	S	E	E	L	R	S	L	Y
G	Q	L	Q	P	S	L	Q	T	G	S	E	E	L	R	S	L	Y
N	T	V	A	T	L	Y	C	V	H	Q	R	I	E	I	K	D	T
K	E	A	L	D	K	I	E	E	E	Q	N	K	S	K	K	K	A
Q	Q	A	A	A	D	T	G	H	S	S	Q	V	S	Q	N	Y	*

3. Amino acid sequence of p17 in membrane bound form [SEQ ID NO: 45]:

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	W	G
T	M	L	L	G	M	L	M	I	C	S	A	G	A	R	A	S	V
L	S	G	G	E	L	D	R	W	E	K	I	R	L	R	P	G	G
K	K	K	Y	K	L	K	H	I	V	W	A	S	R	E	L	E	R
G	Q	L	Q	P	S	L	Q	T	G	S	E	E	L	R	S	L	Y
N	T	V	A	T	L	Y	C	V	H	Q	R	I	E	I	K	D	T
K	E	A	L	D	K	I	E	E	E	Q	N	K	S	K	K	K	A
Q	Q	A	A	A	D	T	G	H	S	S	Q	V	S	Q	N	Y	L
F	I	M	I	V	G	G	L	V	G	L	R	I	V	F	A	V	L
S	V	V	N	R	V	R	Q	G	Y	S	P	L	S	F	Q	T	H
L	P	I	P	R	G	*											

FIGURE 52B

1. Amino acid sequence of p24 in natural form [SEQ ID NO: 49]:

M P I V Q N I Q G Q M V H Q A I S P
R T L N A W V K V V E E K A F S P E
V I P M F S A L S E G A T P Q D L N
T M L N T V G G H Q A A M Q M L K E
T I N E E A A E W D R V H P V H A G
P I A P G Q M R E P R G S D I A G T
T S T L Q E Q I G W M T N N P P I P
V G E I Y K R W I I L G L N K I V R
M Y S P T S I L D I R Q G P K E P F
R D Y V D R F Y K T L R A E Q A S Q
E V K N W M T E T L L V Q N A N P D
C K T I L K A L G P A A T L E E M M
T A C Q G V G G P G H K A R V L *

2. Amino acid sequence of p24 in secreted form [SEQ ID NO: 50]:

M R V K E K Y Q H L W R W G W R W G
T M L L G M L M I C S A P I V Q N I
Q G Q M V H Q A I S P R T L N A W V
K V V E E K A F S P E V I P M F S A
L S E G A T P Q D L N T M L N T V G
G H Q A A M Q M L K E T I N E E A A
E W D R V H P V H A G P I A P G Q M
R E P R G S D I A G T T S T L Q E Q
I G W M T N N P P I P V G E I Y K R
W I I L G L N K I V R M Y S P T S I
L D I R Q G P K E P F R D Y V D R F
Y K T L R A E Q A S Q E V K N W M T
E T L L V Q N A N P D C K T I L K A
L G P A A T L E E M M T A C Q G V G
G P G H K A R V L *

3. Amino acid sequence of p24 in secreted form [SEQ ID NO: 51]:

M R V K E K Y Q H L W R W G W R W G
T M L L G M L M I C S A P I V Q N I
Q G Q M V H Q A I S P R T L N A W V
K V V E E K A F S P E V I P M F S A
L S E G A T P Q D L N T M L N T V G
G H Q A A M Q M L K E T I N E E A A
R E P R G S D I A G T T S T L Q E Q
I G W M T N N P P I P V G E I Y K R
W I I L G L N K I V R M Y S P T S I
L D I R Q G P K E P F R D Y V D R F
Y K T L R A E Q A S Q E V K N W M T
E T L L V Q N A N P D C K T I L K A
L G P A A T L E E M M T A C Q G V G
G P G H K A R V L L F I M I V G G L
V G L R I V F A V L S V V N R V R Q
G Y S P L S F Q T H L P I P R G *

FIGURE 53A

DNA sequence of modified Env including multi-clade V3 loops and Tat [SEQ ID NO: 52]:

Gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacatagcagaataggcgt
tactcgacagaggagagcaagaa**atg**gagccagtagatcctagactagagccc
Tat1
Tggaagcatccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaaagtgttgctt
tcattgccaagtttgtttcataacaaaagccttaggcatctcctatggcaggaagaagcggagac
agcgacgaagacctcctcaaggcagtcagactcatcaagtttctctatcaaagcagtaagtagta
catgtaatgcaacctatacaaatagcaatagtagcattagtagtagcaataataatagcaatagt
tgtgtggtccatagtaatcatagaatataggaaaatattaagacaaagaaaaatagacaggttaa
ttgatagactaatagaaagagcagaagacagtggca**atg**agagtgaaggagaaatatcagcactt
gtggagatgggggtggagatggg
Envelope
Gcaccatgctccttgggatgttgatgatctgtagtgctacagaaaaattgtgggtcacagtctat
tatggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcagatgctaaagcata
tgatacagaggtacataatgtttgggccacacatgcctgtgtacccacagaccccaacccacaag
aagtagtattggtaaatgtgacagaaaattttaacatgtggaaaaatgacatggtagaacagatg
catgaggatataatcagtttatgggatcaaagcctaaagccatgtgtaaaattaaccccactctg
tgtt**ggagctggt**agttgtaacacctca
Delete V1V2, insert Gly,Ala,Gly
gtcattacacaggcctgtccaaaggtatcctttgagccaattcccatacattattgtgccccggc
tggttttgcgattctaaaatgtaataataagacgttcaatggaacaggaccatgtacaaatgtca
gcacagtacaatgtacacatggaattaggccagtagtatcaactcaactgctgttaaatggcagt
ctggcagaagaagaggtagtaattagatctgccaatttcacagacaatgctaaaaccataatagt
acagctgaaccaatctgtagaaattaat**tgt**acaag
First multi-clade repeat
Acccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttgttacaa
taggaaaaataggaaatatgagacaagcacattgtctcgggtgtaccagacctaacaacaataca
agaaaaagtgtacgtataggaccaggacaaacattctatgcaacaggtgatataataggggatat
aagacaagcacattgttgtacgagacccaacaataatacaagaaaaagtataaggataggaccag
gacaagcattctatgcaacaggagaaataataggagatataagacaagcacattgttgcacaagg
ccctacaacaatataagacaaaggacccccataggactagggcaagcactctatacaacaagaag
aatagaagatataagaagagcacattgttgtaccagaccctccaccaatacaagaacaagtatac
gtataggaccaggacaagtattctatagaacaggagacataacaggagatataagaaaagcatat
tgtggatcctgtacaagacccaacaacaatacaagaaaaagaatatctttaggaccaggacgagt
attttatacagcaggagaaataataggagacatcagaaaggcacattgttgtaccagacctaata
acaatacaagaaaaagtataactttgcaccaggacaagcgctctatgcaacaggtgaaataata
ggagatataagacaagcacattgtctcggg**tgt**accagacctaacaacaata
Second multi-clade repeat
Caagaaaaagtgtacgtataggaccaggacaaacattctatgcaacaggtgatataataggggat
ataagacaagcacattgttgtacgagacccaacaataatacaagaaaaagtataaggataggacc
aggacaagcattctatgcaacaggagaaataataggagatataagacaagcacattgttgcacaa
ggccctacaacaatataagacaaaggacccccataggactagggcaagcactctatacaacaaga
agaatagaagatataagaagagcacattgttgtaccagaccctccaccaatacaagaacaagtat
acgtataggaccaggacaagtattctatagaacaggagacataacaggagatataagaaaagcat
attgtggatcctgtacaagacccaacaacaatacaagaaaaagaatatctttaggaccaggacga
gtattttatacagcaggagaaataataggagacatcagaaaggcacattgttgtaccagacctaa
taacaatacaagaaaaagtataacttttgcaccaggacaagcgctctatgcaacaggtgaaataa

FIGURE 53A-continued

taggagatataagacaagcacattgtctcgggaacattagtagagcaaaatggaataacacttt
AvaI site, end of two multi-clade repeat
Aaaacagatagatagcaaattaagagaacaatttggaaataataaaacaataatctttaagcagt
cctcaggaggggacccagaaattgtaacgcacagttttaattgtggaggggaatttttctactgt
aattcaacacaactgtttaatagtacttggtttaatagtacttggagtactaaagggtcaaataa
cactgaaggaagtgacacaatcaccctcccatgcagaataaaacaaattataaacatgtggcagg
aagtaggaaaagcaatgtatgcccctcccatcagtggacaaattagatgttcatcaaatattaca
gggctgctattaacaagagatggtggtaatagcaacaatgagtccgagatcttcagacctggagg
aggagatatgagggacaattggagaagtgaattatataaatataaagtagtaaaaattgaaccat
taggagtagcacccaccaaggcaaagagaagagtggtgcagactagtgcagtgggaataggagct
ttgttccttgg
Delete the cleavage site, insert SpeI site
gttcttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggccagac
aattattgtctggtatagtgcagcagcagaacaatttgctgagggctattgaggcgcaacagcat
ctgttgcaactcacagtctggggcatcaagcagctccaggcaagaatcctggctgtggaaagata
cctaaaggatcaacagctcctggggatttggggttgctctggaaaactcatttgcaccactgctg
tgccttggaatgctagttggagtaataaatctctggaacagatttggaataacatgacctggatg
gagtgggacagagaaattaacaattacacaagcttaatacactccttaattgaagaatcgcaaaa
ccagcaagaaaagaatgaacaagaattattggaattagataaatgggcaagtttgtggaattggt
ttaacataacaaattggctgtggtatataaaattattcataatgatagtaggaggcttggtaggt
ttaagaatagtttttgctgtactttctgtagtgaatagagttaggcagggatattcaccattatc
gtttcagacccacctcccaatcccgaggggacccgacaggcccgaaggaatagaagaagaaggtg
gagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctggtaa

gp41, delete the 300 bp at C-terminal

FIGURE 53B

Amino acid sequence of modified Env including multi-clade V3 loops and Tat [SEQ ID NO: 53]:

M R V K E K Y Q H L W R W G W R W G
T M L L G M L M I C S A T E K L W V
T V Y Y G V P V W K E A T T T L F C
A S D A K A Y D T E V H N V W A T H
A C V P T D P N P Q E V V L V N V T
E N F N M W K N D M V E Q M H E D I
I S L W D Q S L K P C V K L T P L C
V G A G S C N T S V I T Q A C P K V
S F E P I P I H Y C A P A G F A I L
K C N N K T F N G T G P C T N V S T
V Q C T H G I R P V V S T Q L L L N
G S L A E E E V V I R S A N F T D N
A K T I I V Q L N Q S V E I N C T R
P N N N T R K S I R I Q R G P G R A
F V T I G K I G N M R Q A H C L G C
T R P N N N T R K S V R I G P G Q T
F Y A T G D I I G D I R Q A H C C T
R P N N N T R K S I R I G P G Q A F
Y A T G E I I G D I R Q A H C C T R
P Y N N I R Q R T P I G L G Q A L Y
T T R R I E D I R R A H C C T R P S
T N T R T S I R I G P G Q V F Y R T
G D I T G D I R K A Y C G S C T R P
N N N T R K R I S L G P G R V F Y T
A G E I I G D I R K A H C C T R P N
N N T R K S I T F A P G Q A L Y A T
G E I I G D I R Q A H C L G C T R P
N N N T R K S V R I G P G Q T F Y A
T G D I I G D I R Q A H C C T R P N
N N T R K S I R I G P G Q A F Y A T
G E I I G D I R Q A H C C T R P Y N
N I R Q R T P I G L G Q A L Y T T R
R I E D I R R A H C C T R P S T N T
R T S I R I G P G Q V F Y R T G D I
T G D I R K A Y C G S C T R P N N N
T R K R I S L G P G R V F Y T A G E
I I G D I R K A H C C T R P N N N T
R K S I T F A P G Q A L Y A T G E I
I G D I R Q A H C L G N I S R A K W
N N T L K Q I D S K L R E Q F G N N
K T I I F K Q S S G G D P E I V T H
S F N C G G E F F Y C N S T Q L F N
S T W F N S T W S T K G S N N T E G
S D T I T L P C R I K Q I I N M W Q
E V G K A M Y A P P I S G Q I R C S
S N I T G L L L T R D G G N S N N E
S E I F R P G G G D M R D N W R S E
L Y K Y K V V K I E P L G V A P T K
A K R R V V Q T S A V G I G A L F L
G F L G A A G S T M G A A S M T L T
V Q A R Q L L S G I V Q Q Q N N L L
R A I E A Q Q H L L Q L T V W G I K
Q L Q A R I L A V E R Y L K D Q Q L
L G I W G C S G K L I C T T A V P W
N A S W S N K S L E Q I W N N M T W
M E W D R E I N N Y T S L I H S L I
E E S Q N Q Q E K N E Q E L L E L D
K W A S L W N W F N I T N W L W Y I
K L F I M I V G G L V G L R I V F A
T H L P I P R G P D R P E G I E E E
G G E R D R D R S I R L V N G S L A
L I W *

FIGURE 54A

DNA sequence of modified Env including multi-clade V3 loops, Tat and Rev [SEQ ID NO: 54]:

gaattctgcaacaactgctgtttatccattttcagaattgggtgtcgacatagcagaat
aggcgttactcgacagaggagagcaagaa**atg**gagccagtagatcctagactagagccc
Tat1
tggaagcatccaggaagtcagcctaaaactgcttgtaccaattgctattgtaaaaagtg
ttgctttcattgccaagtttgtttcataacaaaagccttaggcatctcct**atg**gcagga
Rev1
agaagcggagacagcgacgaagacctcctcaaggcagtcagactcatcaagtttctcta
tcaaagcagtaagtagtacatgtaatgcaacctatacaaatagcaatagtagcattagt
agtagcaataataatagcaatagttgtgtggtccatagtaatcatagaatataggaaaa
tattaagacaaagaaaaatagacaggttaattgatagactaatagaaagagcagaagac
agtggca**atg**agagtgaaggagaaatatcagcacttgtggagatgggggtggagatggg
Envelope
Gcaccatgctccttgggatgttgatgatctgtagtgctacagaaaaattgtgggtcaca
gtctattatggggtacctgtgtggaaggaagcaaccaccactctattttgtgcatcaga
tgctaaagcatatgatacagaggtacataatgtttgggccacacatgcctgtgtaccca
cagaccccaacccacaagaagtagtattggtaaatgtgacagaaaattttaacatgtgg
aaaaatgacatggtagaacagatgcatgaggatataatcagtttatgggatcaaagcct
aaagccatgtgtaaaattaaccccactctgtgtt**ggagctggt**agttgtaacacctca
Delete V1V2, insert Gly,ala,gly
gtcattacacaggcctgtccaaaggtatcctttgagccaattcccatacattattgtgc
*cccggctgg*ttttgcgattctaaaatgtaataataagacgttcaatggaacaggaccat
gtacaaatgtcagcacagtacaatgtacacatggaattaggccagtagtatcaactcaa
ctgctgttaaatggcagtctggcagaagaagaggtagtaattagatctgccaatttcac
agacaatgctaaaaccataatagtacagctgaaccaatctgtagaaattaat**tgt**acaa
g
First multi-clades repeat
Acccaacaacaatacaagaaaaagtatccgtatccagagaggaccagggagagcatttg
ttacaataggaaaaataggaaatatgagacaagcacattgtctcgggtgtaccagacct
aacaacaatacaagaaaaagtgtacgtataggaccaggacaaacattctatgcaacagg
tgatataataggggatataagacaagcacattgttgtacgagacccaacaataatacaa
gaaaaagtataaggataggaccaggacaagcattctatgcaacaggagaaataatagga
gatataagacaagcacattgttgcacaaggccctacaacaatataagacaaaggacccc
cataggactagggcaagcactctatacaacaagaagaatagaagatataagaagagcac
attgttgtaccagaccctccaccaatacaagaacaagtatacgtataggaccaggacaa
gtattctatagaacaggagacataacaggagatataagaaaagcatattgtggatcctg
tacaagacccaacaacaatacaagaaaaagaatatctttaggaccaggacgagtatttt
atacagcaggagaaataataggagacatcagaaaggcacattgttgtaccagacctaat
aacaatacaagaaaaagtataacttttgcaccaggacaagcgctctatgcaacaggtga
aataataggagatataagacaagcacattgt*ctcggg***tgt**accagacctaacaacaata
Second multi-clade repeat
caagaaaaagtgtacgtataggaccaggacaaacattctatgcaacaggtgatataata
ggggatataagacaagcacattgttgtacgagacccaacaataatacaagaaaaagtat

FIGURE 54A-continued

aaggataggaccaggacaagcattctatgcaacaggagaaataataggagatataagac
aagcacattgttgcacaaggccctacaacaatataagacaaaggacccccataggacta
gggcaagcactctatacaacaagaagaatagaagatataagaagagcacattgttgtac
cagaccctccaccaatacaagaacaagtatacgtataggaccaggacaagtattctata
gaacaggagacataacaggagatataagaaaagcatattgtggatcctgtacaagaccc
aacaacaatacaagaaaaagaatatctttaggaccaggacgagtattttatacagcagg
agaaataataggagacatcagaaaggcacattgttgtaccagacctaataacaatacaa
gaaaaagtataacttttgcaccaggacaagcgctctatgcaacaggtgaaataatagga
gatataagacaagcacattgtctcgggaacattagtagagcaaaatggaataacacttt
AvaI site, end of two multi-clade repeat
Aaaacagatagatagcaaattaagagaacaatttggaaataataaaacaataatcttta
agcagtcctcaggaggggacccagaaattgtaacgcacagttttaattgtggaggggaa
ttttttctactgtaattcaacacaactgtttaatagtacttggtttaatagtacttggag
tactaaagggtcaaataacactgaaggaagtgacacaatcaccctcccatgcagaataa
aacaaattataaacatgtggcaggaagtaggaaaagcaatgtatgcccctcccatcagt
ggacaaattagatgttcatcaaatattacagggctgctattaacaagagatggtggtaa
tagcaacaatgagtccgagatcttcagacctggaggaggagatatgagggacaattgga
gaagtgaattatataaatataaagtagtaaaaattgaaccattaggagtagcacccacc
aaggcaaagagaagagtggtgcagactagtgcagtgggaataggagctttgttccttgg
Delete the cleavage site, insert SpeI
gttcttgggagcagcaggaagcactatgggctgcacgtcaatgacgctgacggtacagg
ccagacaattattgtctgatatagtgcagcagcagaacaatttgctgagggctattgag
gcgcaacagcatctgttgcaactcacagtctggggcatcaaacagctccaggcaagaat
cctggctgtggaaagatacctaaaggatcaacagctcctggggatttggggttgctctg
gaaaactcatttgcaccactgctgtgccttggaatgctagttggagtaataaatctctg
gaacagatttggaataacatgacctggatggagtgggacagagaaattaacaattacac
aagcttaatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaag
aattattggaattagataaatgggcaagtttgtggaattggtttaacataacaaattgg
ctgtggtatataaaattattcataatgatagtaggaggcttggtaggtttaagaatagt
ttttgctgtactttctatagtgaatagagttaggcagggatattcaccattatcgtttc
agacccacctcccaatcccgaggggacccgacaggcccgaaggaatagaagaagaaggt
ggagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctg
ggacgatctgcggagcctgtgcctcttcagctaccaccgcttgagagacttactcttga
ttgtaacgaggattgtggaacttctgggacgcaggggtgggaagccctcaaatattgg
tggaatctcctacagtattggagtcaggaactaaagaatagtgctgttaacttgctcaa
tgccacagccatagcagtagctgagtaa

gp41, but 99 bp truncation at C-terminal

FIGURE 54B

Amino acid sequence of modified Env including multi-clade V3 loops, Tat and Rev [SEQ ID NO: 55]:

```
M R V K E K Y Q H L W R W G W R W G
T M L L G M L M I C S A T E K L W V
T V Y Y G V P V W K E A T T L F C
A S D A K A Y D T E V H N V W A T H
A C V P T D P N P Q E V V L V N V T
E N F N M W K N D M V E Q M H E D I
I S L W D Q S L K P C V K L T P L C
V G A G S C N T S V I T Q A C P K V
S F E P I P I H S Y C A P A G F A I L
K C N N K T F N G T G P C T N V S T
V Q C T H G I R P V V S T Q L L L N
G S L A E E E V V I R S A N F T D N
A K T I I V Q L N Q S V E I N C T R
P N N N T R K S I R I Q R G P G R A
F V T I G K I G N M R Q A H C L G C
T R P N N N T R K S V R I G P G Q T
F Y A T G D I I G D I R Q A H C C T
R P N N N T R K S I R I G Q A F
Y A T G E I I G D I R Q A H C C T R
P Y N N I R Q R T P R I G L G Q A L Y
T T R R I E D I R R A H C C T R P S
T N T R T S I R I G P G Q V F Y R T
G D I T G D I R K A Y C G S C T R P
N N N T R K R I S L G P G R V F Y T
A G E I I G D I R K A H C C T R P N
N N T R K S I T F A P G Q A L Y A T
G E I I G D I R Q A H C L G C T R P
N N N T R K S V R I G P G Q T F Y A
T G D I I G D I R Q A H C C T R P N
N N T R K S I R I G P G Q A F Y A T
G E I I G D I R Q A H C C T R P Y N
N I R Q R T P I G L G Q A L Y T T R
R I E D I R R A H C C T R P S T N T
R T S I R I G P G Q V F Y R T G D I
T G D I R K A Y C G S C T R P N N N
T R K R I S L G P G R V F Y T A G E
I I G D I R K A H C C T R P N N N T
R K S D I T F A P G Q A L Y A T G E I
I G D I I R Q A H C L G N I S R A K W
N N T L I K Q I D S S K L R E Q F G N N
K T I I F K Q S S S G G D P E I V T H
S F N C G G E F F Y C N S T Q L F N
S T W F N S T W S T T K G S I N N T E G
S D T I T L P C R I K Q I I N M W Q
E V G K T A M Y A P P I P I S G G Q I R C S
S N I T G L L L T R D G G N S N N S E
S E I F R P G G G D M R D N W R S E
L Y K Y K V V K I E P L G V A P T K
A K R R V V Q T S T A V G I G A L F L
G F L G A A G S T M G C T S M T L T
V Q A R Q L L S S D I V Q Q Q N N L L
R A I E A Q Q H L L Q L T V W G I K
Q L Q A R I L A V E R Y L K D Q Q L
L G I W G C S G K L I C T T A V P W
N A S W S N K S N L E Q I S W N N M T W
M E W D R E I N N Y T S L I H S L I
E E W S Q N Q Q E K N E Q E N L L E L D
K E W A S L W N W F N I T N W L L W Y I
K L F S I M I V G G L V G L R I V F A
V L S I V N R V R Q G Y S P L S F Q
T H L E P I P R G P D R P E G I E E E
G G E W R D D L R S I C L F V S L G H R L A
D L L L L I V T R I V E L L G R R G W
E A L K Y W W N L L Q Y W S Q E L K
N S A V N L L N A T A I A V A E *
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FIGURE 55A

DNA sequence of HIV-1 (strain BH10) Protease (PI, *nt* 1407-1907) [SEQ ID NO: 56]:

atgttctttagggaagatctggccttcctacaagggaaggccagggaattttcttcagagcagaccagagcca
acagccccaccatttcttcagagcagaccagagccaacagccccaccagaagagagcttcaggtctggggt
agagacaacaactccccctcagaagcaggagccgatagacaaggaactgtatcctttaacttccctcagatc
actctttggcaacgacccctcgtcacaataaagataggggggcaactaaaggaagctctattagatacagga
gcagatgatacagtattagaagaaatgagtttgccaggaagatggaaaccaaaaatgatagggggaattgg
aggttttatcaaagtaagacagtatgatcagatactcatagaaatctgtggacataaagctataggtacagtatt
agtaggacctacacctgtcaacataattggaagaaatctgttgactcagattggttgcactttaaatttttaa

FIGURE 55B

Amino acid sequence of HIV-1 (strain BH10) Protease (PI) [SEQ ID NO: 57]:

M	F	F	R	E	D	L	A	F	L	Q	G	K	A	R	E	F	S
S	E	Q	T	R	A	N	S	P	T	I	S	S	E	Q	T	R	A
N	S	P	T	R	R	E	L	Q	V	W	G	R	D	N	N	S	P
S	E	A	G	A	D	R	Q	G	T	V	S	F	N	F	P	Q	I
T	L	W	Q	R	P	L	V	T	I	K	I	G	G	Q	L	K	E
A	L	L	D	T	G	A	D	D	T	V	L	E	E	M	S	L	P
G	R	W	K	P	K	M	I	G	G	I	G	G	F	I	K	V	R
Q	Y	D	Q	I	L	I	E	I	C	G	H	K	A	I	G	T	V
L	V	G	P	T	P	V	N	I	I	G	R	N	L	L	T	Q	I
G	C	T	L	N	F	*											

FIGURE 56A

DNA sequence of HIV-1 (strain BH10) Gag-PI [SEQ ID NO: 58]:

Atgggtgcgagagcgtcagtattaagcgggggagaattagatcgatgggaaaaaattcg
gttaaggccaggggaaagaaaaaatataaattaaaacatatagtatgggcaagcaggg
agctagaacgattcgcagttaatcctggcctgttagaaacatcagaaggctgtagacaa
atactgggacagctacaaccatcccttcagacaggatcagaagaacttagatcattata
taatacagtagcaaccctctattgtgtgcatcaaaggatagagataaaagacaccaagg
aagctttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagca
gcagctgacacaggacacagcagtcaggtcagccaaaattaccctatagtgcagaacat
ccaggggcaaatggtacatcaggccatatcacctagaactttaaatgcatgggtaaaag
tagtagaagagaaggctttcagcccagaagtaatacccatgttttcagcattatcagaa
ggagccaccccacaagatttaaacaccatgctaaacacagtgggggacatcaagcagc
catgcaaatgttaaaagagaccatcaatgaggaagctgcagaatgggatagagtacatc
cagtgcatgcagggcctattgcaccaggccagatgagagaaccaaggggaagtgacata
gcaggaactactagtacccttcaggaacaaataggatggatgacaaataatccacctat
cccagtaggagaaatttataaaagatggataatcctgggattaaataaaatagtaagaa
tgtatagccctaccagcattctggacataagacaaggaccaaaagaacctttagagac
tatgtagaccggttctataaaactctaagagccgagcaagcttcacaggaggtaaaaaa
ttggatgacagaaaccttgttggtccaaaatgcgaacccagattgtaagactattttaa
aagcattgggaccagcggctacactagaagaaatgatgacagcatgtcagggagtagga
ggacccggccataaggcaagagttttggctgaagcaatgagccaagtaacaaatacagc
taccataatgatgcagagaggcaattttaggaaccaaagaaagatggttaagtgtttca
attgtggcaaagaagggcacacagccagaaattgcagggcccctaggaaaaagggctgt
tggaaatgtggaaaggaaggacaccaaatgaaagattgtactgagagacaggctaattt
ctttagggaagatctggccttcctacaagggaaggccagggaatttcttcagagcaga
ccagagccaacagccccaccatttcttcagagcagaccagagccaacagccccaccaga
agagagcttcaggtctggggtagagacaacaactccccctcagaagcaggagccgatag
acaaggaactgtatcctttaacttccctcagatcactctttggcaacgacccctcgtca
caataaagataggggggcaactaaaggaagctctattagatacaggagcagatgataca
gtattagaagaaatgagtttgccaggaagatggaaaccaaaaatgatagggggaattgg
aggttttatcaaagtaagacagtatgatcagatactcatagaaatctgtggacataaag
ctataggtacagtattagtaggacctacacctgtcaacataattggaagaaatctgttg
actcagattggttgcactttaaatttttaa

FIGURE 57

Primers for multi-clade V3 loops:

Clade A: (1). forward primer A888F5 [SEQ ID NO: 60]:
5'-aaa tca acc gga att gaa ttc c**ct cgg g**tg tac cag acc taa caa caa tac-3'
EcoRI AvaI
(2). reverse primer A-CR3 [SEQ ID NO: 61]:
5'-att gtt ggg tct cgt aca aca atg tgc ttg tct tat atc ccc-3'

Clade C: (3). forward primer A-CF5 [SEQ ID NO: 62]:
5'-ggg gat ata aga caa gca cat tgt acg aga ccc aac aat ac-3'
(4). reverse primer C980R3 [SEQ ID NO: 63]:
5'-gtt gta ggg cct tgt gca aca atg tgc ttg tct tat atc –3'

Clade D: (5). forward primer D888F5 [SEQ ID NO: 64]:
5'-gat ata aga caa gca cat tgt tgc aca agg ccc tac aac-3'
(6). reverse primer D-ER3 [SEQ ID NO: 65]:
5'-ggt gga ggg tct ggt aca aca atg tgc tct tct tat –3'

Clade E: (7). forward primer D-EF5 [SEQ ID NO: 66]:
5' -ata aga aga gca cat tgt tgt acc aga ccc tcc acc-3'
(8). reverse primer E998R3 [SEQ ID NO: 67]:
5'-gta ttg ttg ttg ggt ctt gta caa caa tat gct ttt ctt ata tct cc-3'

Clade F: (9). forward primer F888F5 [SEQ ID NO: 68]:
5'-gga gat ata aga aaa gca tat tgt tgt aca aga ccc aac aac aat ac-3'
(10). reverse primer F-GR3 [SEQ ID NO: 69]:
5'-gtt att agg tct ggt aca aca atg tgc ctt tct gat gtc-3'

Clade G: (11). forward primer F-GF5 [SEQ ID NO: 70]:
5'-gac atc aga aag gca cat tgt tgt acc aga cct aat aac-3'
(12). reverse primer G989R3 [SEQ ID NO: 71]:
5'-aat aaa cta gtc tag acc **ccc gag** tct aga aca atg tgc ttg tct tat atc tcc-3'
AvaI XbaI